Issued September 1970

SOIL SURVEY

Berks County Pennsylvania

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
THE PENNSYLVANIA STATE UNIVERSITY
Agricultural Experiment Station and Agricultural Extension Service
and the
PENNSYLVANIA DEPARTMENT OF AGRICULTURE
State Soil and Water Conservation Commission

Major fieldwork for this soil survey was done in the period 1947–64. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1964. This survey was made cooperatively by the Soil Conservation Service and the Pennsylvania State University, Agricultural Experiment Station and Agricultural Extension Service; and the Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission. It is part of the technical assistance furnished to the Berks County Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased, on individual order, from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Berks County contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in deciding the worth of tracts of land for agriculture, industry, or recreation.

Locating Soils

All the soils of Berks County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of the capability units.

Foresters and others can refer to the subsection "Use of the Soils as Woodland," where a table indicates suitability of the soils for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the subsection "Use of the Soils for Wildlife."

Community planners and others concerned with community development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the subsection "Use of the Soil Survey in Community Development."

Engineers and builders will find, under "Use of the Soils for Engineering," tables that give engineering descriptions of the soils in the county and that name soil features affecting engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers in Berks County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Additional Facts About the County."

Cover picture

Undulating to rolling Berks soils farmed in contour strips. Alfalfa and oats in field in the foreground and corn and wheat in field in background. Blue Mountain in extreme background.

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BY FRANKLIN S. ACKERMAN, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY FRANKLIN S. ACKERMAN, J. B. CAREY, MILTON FRENCH, WILLIAM D. HANNIGAN, HERBERT HOPPER, WILLIAM H. HOUCK, RAYMOND MATTERN, EARL REBER, EDWARD ROPEL, AND DAVID TAYLOR, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE PENNSYLVANIA STATE UNIVERSITY, AGRICULTURAL EXPERIMENT STATION AND AGRICULTURAL EXTENSION SERVICE, AND THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE, STATE SOIL AND WATER CONSERVATION COMMISSION

BERKS COUNTY, in the southeastern part of Pennsylvania (fig. 1), has a total area of 864 square miles. It is located within short driving distance of Philadelphia, Allentown, Harrisburg, New York City, and Baltimore. Reading, an industrial city, is the county seat. The population of the county was 275,414 in 1963.

Most of the county is rolling, but the Blue Mountain in the northern part and the South Mountain in the southern part stand out sharply above the local valleys. The climate is fairly uniform throughout the area.

The soils are of many different kinds. They have formed in material that weathered from shale, limestone, and gneiss. Most of them are suited to a number of different kinds of field crops, truck crops, and fruit trees.

Steel and textile industries are the major sources of employment, but the manufacturing of food products also provides some employment. Also, many smaller industries have developed as a result of the value of the minerals in the underlying bedrock, especially limestone and iron ore. Access to major highways and railroads has been an important factor in the development of industries in this county.

Dairying is a main source of farm income. Finishing of beef cattle for market is growing in importance, however, and the raising of hogs, sheep and lambs, chickens, and turkeys is important. The high income from the sale of farm products has been the result, to a great extent, of the large areas of deep, productive soils.

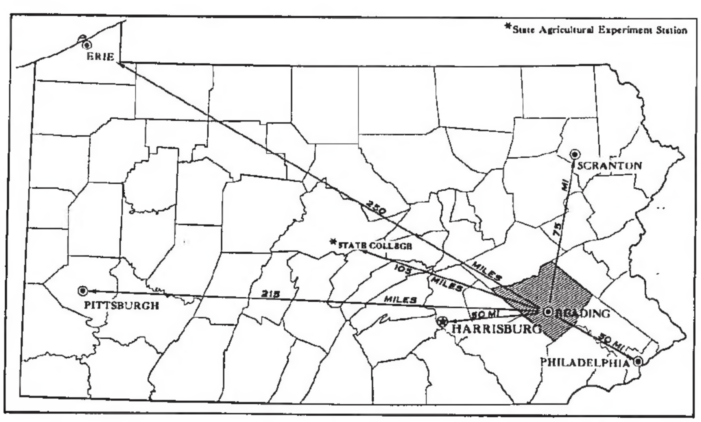

Figure 1.—**Location of Berks County in Pennsylvania.**

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Berks County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams, kinds of native plants or crops; kinds of rocks; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this soil survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Berks and Athol, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in tex-

ture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Philo loam and Philo silt loam are two soil types in the Philo series. The difference in texture of their surface layer is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Athol silt loam, 3 to 8 percent slopes, moderately eroded, is one of several phases of Athol silt loam, a soil type that ranges from nearly level to hilly.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodland, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed, and so small in size, that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Weikert-Berks shaly silt loams, 3 to 8 percent slopes, moderately eroded. In other places, if the difference between two soils is too small to justify separate mapping, two or more similar soils are mapped as a single unit, called an undifferentiated soil group. An example in Berks County is Edgemont and Dekalb very stony sandy loams, 0 to 8 percent slopes.

Also, on most soil maps areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they can scarcely be called soils. These areas are shown on a soil map like other mapping units, but they are given a descriptive name, such as Rubble land, and are called land types rather than soils. Made land, limestone materials, sloping, is another example of a land type in Berks County. It consists of areas where the soils have been disturbed by roadwork or construction activities to such an extent that the original characteristics of the soils have been obliterated.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil surveys. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups and test them by further study and by consultation with farmers, agronomists, engineers, and others. The scientists then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Berks County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The 11 soil associations in Berks County are described in the following paragraphs. More detailed information about the soils is given in the section "Descriptions of the Soils."

1. Edgemont-Dekalb Association

Deep and moderately deep, well-drained soils formed mainly in material from sandstone and quartzite; on Blue Mountain and on the hills in the southern part of the county

This association consists of steep or very steep soils in mountainous or hilly areas. It occupies narrow bands on the upper slopes and crests of Blue Mountain and is on the hills in the southern part of the county, where the soils are generally underlain by light-colored sandstone and quartzite (fig. 2). The association is mainly under forest. It occupies about 3 percent of the county.

Edgemont soils make up about 45 percent of the association. They are deep, light colored, and loamy, and they contain many stones and boulders.

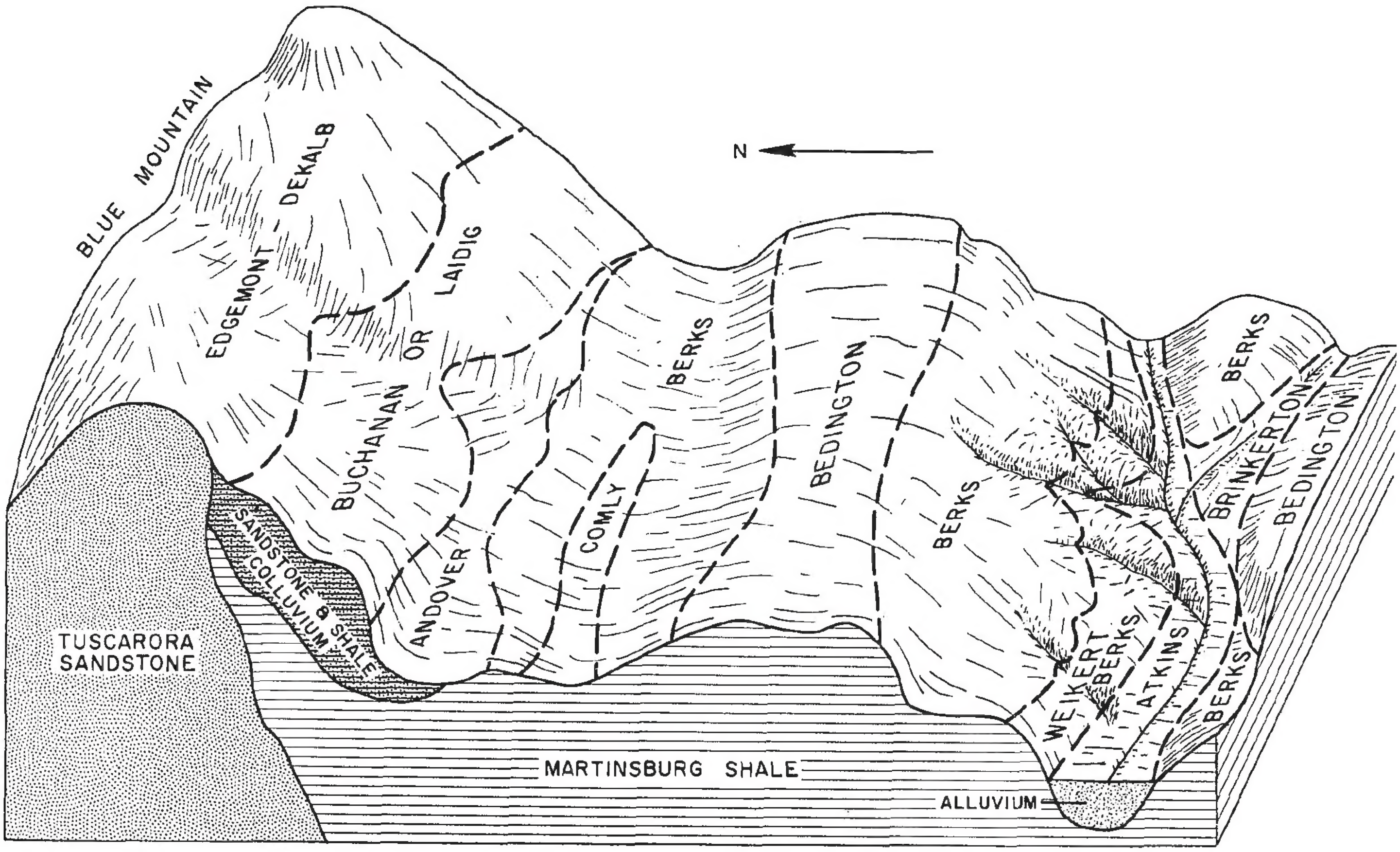

***Figure 2.*—Cross section of the northern part of Berks County showing soils of associations 1, 2, and 3.**

Dekalb soils make up another 45 percent. They are moderately deep and are generally stony.

Rubble land occupies the rest of this association. It is on the upper slopes of Blue Mountain.

The soils of this association are rather droughty, have low natural fertility, and are poorly suited to cultivated crops. They are fairly well suited to trees and are well suited to use for wildlife and recreation. The principal kinds of trees are white, black, red, and chestnut oaks. Steep slopes and the lack of roads make most of the association inaccessible.

2. Laidig-Buchanan-Andover Association

Deep soils formed in colluvium on the lower slopes of Blue Mountain

This association consists of soils on the lower slopes of Blue Mountain (see fig. 2). It occupies nearly 3 percent of the county.

About 40 percent of the association consists of Laidig soils, which have convex slopes and are at a higher elevation than the other soils. Laidig soils are deep and well drained, and they have moderate available moisture capacity and moderate natural fertility. Because of their position on the sides of Blue Mountain, surface runoff is medium to rapid and less water moves through the profile than where runoff is slower. The subsoil is well defined and contains a reddish layer.

Buchanan soils occupy another 40 percent of the association. They generally lie below areas of Laidig soils and above areas of Andover soils. Buchanan soils are deep, are moderately well drained, and have moderate available moisture capacity and moderate natural fertility. A fragipan is in the lower part of their subsoil.

Andover soils make up about 20 percent of the association. They are on the lowest slopes and receive more runoff than the other soils, which tends to keep them wet. Andover soils are too stony and wet for cultivation and are mainly under forest.

Minor areas in this association are occupied by small patches of Rubble land. Atkins soils occupy other small areas.

Stones and the seasonal high water table limit this association for cultivated crops and for some other uses. Dairying and the raising of poultry are the principal farm enterprises. The farms are generally small, and many farmers work part time off the farm. Some areas are used for recreation; campsites and sites for cabins are common along the base of Blue Mountain.

3. Berks-Weikert-Bedington Association

Shallow to deep, well-drained, rolling soils formed in material weathered mainly from shale and siltstone

This association consists of gently sloping to steep soils that occupy a broad area extending across the northern

part of Berks County. This area lies between Blue Mountain and the limestone valley that reaches from Allentown (in Lehigh County) to Kutztown. The soils have formed in material from black or gray shale and siltstone that generally has weathered to a brownish or olive-gray color. The association occupies about 35 percent of the county.

Berks soils (see fig. 2) make up about 60 percent of the association. They are generally rolling to hilly and are moderately deep and well drained. These soils have a shaly subsoil and have low available moisture capacity and moderate to low natural fertility. Most areas of Berks soils are farmed.

Weikert soils, which are generally steeper than the other soils, make up about 25 percent of the association. They are shallow over bedrock. Weikert soils are well drained but are rather droughty and low in natural fertility.

Nearly level or gently sloping Bedington soils occupy about 10 percent of the association. They are deep, well drained, and moderately fertile. Most of their acreage is cultivated.

Minor soils occupy about 5 percent of the association. Most extensive of these are the moderately well drained Comly and the poorly drained Brinkerton soils. A small acreage is occupied by soils on flood plains.

Most of the association is in general farms, but there are some dairy farms and other farms where the raising of beef cattle is the main source of income. The soils that are steep, eroded, or poorly drained are generally used for pasture or are left in trees. Depth to bedrock is a limitation to many uses of these soils.

4. Ryder-Fogelsville Association

Moderately deep and deep, well-drained, silty soils that are undulating and formed in material weathered from cement rock

One small area of this association is in Oley Valley. The main areas, however, extend across the center part of the county in a line that resembles a belt, between the hills underlain by shale and the limestone valley. The association is characterized by some areas of nearly level or gently sloping, deep soils and by other areas of steeper soils that are moderately deep. The soils have formed in material that weathered from cement rock. They are silty and have a profile that is mainly yellowish brown. The association occupies nearly 3 percent of the county.

Moderately deep, well-drained Ryder soils occupy about 70 percent of the association. They have moderate available moisture capacity and moderate to high natural fertility. The Ryder soils are generally steeper than the Fogelsville soils.

Deep, well-drained, nearly level or gently sloping Fogelsville soils occupy about 25 percent of the association. They have high available moisture capacity and high natural fertility.

Minor soils are the moderately well drained Wiltshire and Lindside. The Wiltshire soils are more extensive than the Lindside, but together these soils occupy about 5 percent of the association. The Wiltshire soils are generally on flats or in depressions, and the Lindside soils are in closed depressions, in drainageways, and on flood plains.

The soils of this association are productive and are well suited to most of the crops commonly grown in the county. They are generally used intensively for cultivated crops, even though they are easily eroded. Several large cement rock and limestone quarries are located within the association. They are owned and operated by manufacturers of cement, who also own tracts of land that they lease to farmers for growing alfalfa, corn, and other crops. Where the soils are used for some purposes, sinkholes in a few areas are a limitation. In those places contamination of the ground water through drainage into the sinkholes is a hazard.

5. Duffield-Washington Association

Deep, well-drained, undulating soils formed in material weathered from limestone in limestone valleys

This association constitutes a belt of soils, about 4 miles wide, in the central part of Berks County (fig. 3). The belt runs from northeast to southwest across the county and is known as the Wernersville-Reading-Kutztown Valley. A smaller area is in Oley Valley in the east-central part of the county. In the area in Oley Valley, the soils are undulating and the proportion of wet soils is greater than in the belt. This association makes up nearly 15 percent of the county.

Duffield soils, which are deep and well drained, occupy about 50 percent of this association. They have formed in material derived from impure limestone. Duffield soils have high available moisture capacity and high natural fertility. They are productive soils for farming.

Washington soils, which are also well drained, occupy about 40 percent of the association. They have a brownish color and have formed in material derived largely from limestone and in transported shaly and gravelly material from the adjacent uplands. Washington soils are productive and are intensively farmed.

Minor soils in this association are the Hagerstown, which make up nearly 10 percent of the association, and small areas of Wiltshire, Burgin, Lindside, and Melvin soils. The Hagerstown soils are more reddish and more clayey than the Duffield and Washington soils, and they contain more outcrops of limestone. The Wiltshire soils, which are moderately well drained, and the Burgin soils, which are poorly drained, are mainly in depressions and in drainageways. The Lindside and Melvin soils are along streams that flow through the area.

In this association the farmers are engaged primarily in dairy farming, but some raise beef cattle or poultry. Only a few small areas, consisting mainly of wet or stony soils, are not farmed and remain in woods. The soils are the best for crops of any in the county, and they have few limitations for that purpose. Sinkholes are a limitation to some other uses. Using the soils for some purposes could result in contamination of the ground water by drainage into the sinkholes or into solution chambers and channels in the underlying bedrock.

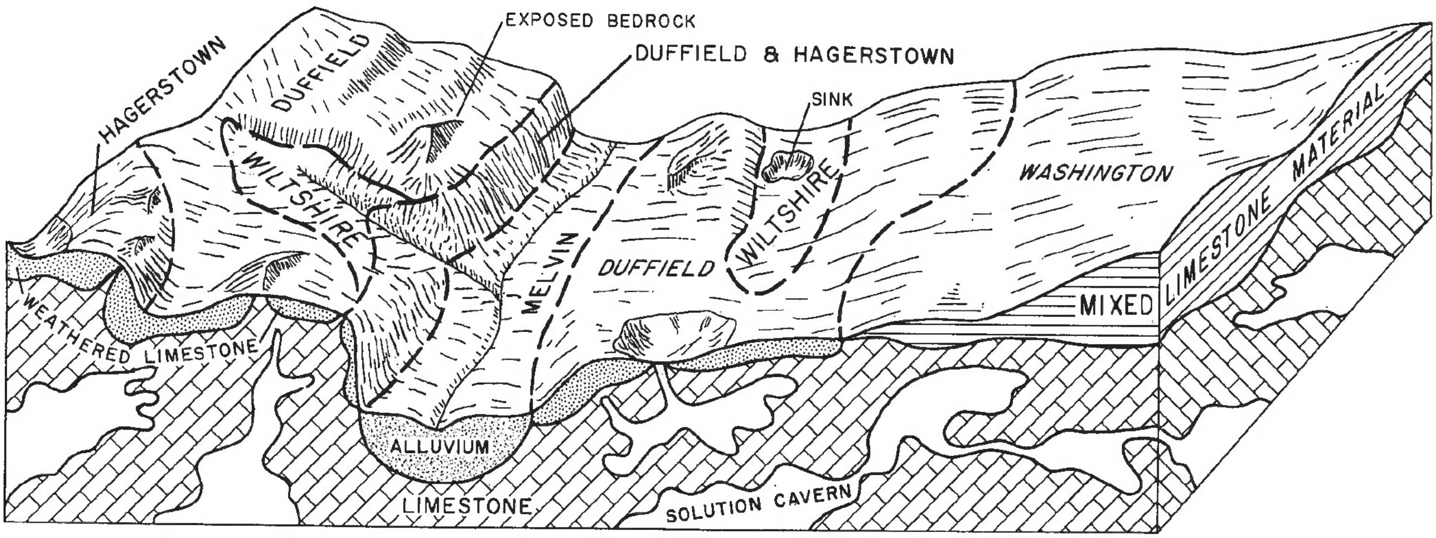

Figure 3.—Major soils in association 5, in limestone valleys, and their relationship to one another.

6. Murrill Association

Deep, well-drained soils formed in colluvium on the foot slopes of South Mountain

This association consists mostly of strongly sloping Murrill soils that occur in a long, narrow band along the lower slopes of South Mountain. The Murrill soils have formed in colluvium that was deposited at the base of South Mountain over material weathered from limestone. Depressions in the underlying limestone are apparent in some places. This association occupies about 2 percent of the county.

Murrill soils make up about 90 percent of the association. These deep, well-drained soils have high available moisture capacity.

A minor acreage in the association is occupied by Wiltshire soils. These and other soils in small areas occupy about 10 percent of the association.

The areas of Murrill soils that are free of stones are cultivated and are highly productive. The stony areas are generally used for pasture or trees. The farms in this association are diversified, but dairying is the leading farm enterprise. A few farmers derive most of their income from orchards and growing truck crops.

7. Chester-Glenville-Brandywine Association

Deep and moderately deep, well drained and moderately well drained, rolling to hilly soils formed in material weathered from granitic gneiss and other igneous or metamorphosed rocks on Reading Hills and South Mountain

Rolling to hilly soils of the Reading Hills and of the western extension of the Reading Hills, called South Mountain, make up most of this association. The association is mainly in the southeastern part of the county. About half of it is in farms and about half is in trees. The soils are generally stony. They have formed mainly in deeply weathered saprolite that is deep over bedrock. The association occupies nearly 19 percent of the county.

Chester soils occupy about 70 percent of the association. They are deep, gritty, and well drained, and they have a subsoil that is mainly yellowish red. Chester soils have high available moisture capacity and high natural fertility. In most fields made up of these soils, the stones and boulders have been removed to make tillage easier.

Glenville soils make up about 15 percent of the association. They are deep, moderately well drained, and medium textured, and they occur in depressions and on the lower slopes. Glenville soils have a seasonal high water table and contain a fragipan that slows the movement of air and water and restricts the growth of roots. They can be used for crops that are able to withstand wetness caused by the seasonal high water table.

About 10 percent of the association consists of well-drained Brandywine soils. These soils have formed in material weathered from granitic gneiss, and they are moderately deep over hard rock. They have moderate to low available moisture capacity, have moderate natural fertility, and are generally very stony.

Small areas of Edgemont soils occupy a minor acreage in the association. These soils are deep and well drained, and they have low natural fertility. Except for stoniness and strong slopes, limitations are few if the soils are used for farming. The soils are also well suited to many other purposes.

8. Penn-Reaville-Croton Association

Moderately deep and deep, well-drained to poorly drained soils formed in material weathered from red shale and some soft sandstone

This association consists of soils that have smooth, gentle or moderate slopes. The areas are in the southern and eastern parts of the county. One area, north of U.S. Highway No. 422, extends from Reading east toward Pottstown (in Montgomery County), then north to Boyertown and Bally along the Montgomery County line. This association makes up about 6 percent of the county.

Gently sloping to strongly sloping Penn soils occupy

about 80 percent of this association. They are moderately deep and are well drained. Penn soils have formed in material weathered from red shale and sandstone. They have moderate to low available moisture capacity and low natural fertility.

Reaville soils occupy about 10 percent of the association. They are moderately deep over red shale and are somewhat poorly drained to moderately well drained. Reaville soils tend to be wet in spring and dry in summer. They have low available moisture capacity and low natural fertility.

Croton, Klinesville, and other minor soils occupy about 10 percent of the association. The Croton soils are on flats, in depressions, and in drainageways. They contain a fragipan and are generally too wet for growing crops. The Klinesville soils are steep in places and are shallow over shale. They are also poorly suited to crops.

In general, lack of ability to supply adequate moisture to plants makes the soils of this association poorly suited to field crops. Where the soils are used for some purposes, restricted depth to bedrock and a seasonal high water table are severe limitations.

9. Lewisberry-Penn Association

Deep and moderately deep, well-drained, rolling to hilly soils formed in material weathered from red sandstone conglomerate and some shale

Rolling to hilly soils in the southern part of the county make up this association. The areas are south and west of the Schuylkill River. About 70 percent of the association is wooded, but general crops are grown on some of the rolling soils in the central part of the main area. This association occupies about 9 percent of the county.

Lewisberry soils make up about 70 percent of the association. These are deep, well-drained, reddish soils that are moderately coarse textured and contain little clay. They have moderate available moisture capacity and low natural fertility.

Penn soils make up about 20 percent of the association. They are moderately deep and are dusky red in the lower part of their profile. Penn soils have low to moderate available moisture capacity and low natural fertility. Droughtiness and erosion are the major hazards if these soils are cultivated.

Deep, moderately well drained Readington soils and poorly drained Croton soils occupy minor acreages. The rest of the association consists of small areas of Rowland and Bowmansville soils.

This association is only fairly well suited to farming but is well suited to trees. Where these soils are used for some purposes, strong slopes or stones are limitations.

10. Neshaminy-Brecknock Association

Deep, well-drained soils on ironstone ridges and in adjacent areas

This association consists of soils on ridges and in high areas, generally within areas of soil associations 8 and 9. The high areas were caused by intrusive dikes that have penetrated the red sandstone and shale in the southern part of the county. The association occupies about 4 percent of the county.

Neshaminy soils occupy about 50 percent of the association (fig. 4). They are reddish, deep, and well drained, and they have formed in material that weathered from dark, basic igneous rocks. Neshaminy soils contain a large number of stones and boulders. They are mainly in trees, but small areas, cleared of trees and stones, are farmed.

Brecknock soils occupy about 40 percent of the association. They generally occur in narrow strips between areas of Neshaminy soils and Penn or Lewisberry soils. Brecknock soils have formed in material weathered from metamorphosed shale and siltstone that was originally red. They are deep, are well drained, and have low natural fertility and moderate available moisture capacity.

About 10 percent of the association consists of Lehigh and other soils. In many places the Lehigh soils occur in small areas with Brecknock soils.

Most of this association is in forests of red and black oak or tulip-poplar. Some areas have been cleared, however, and are used to grow general crops. Except for stoniness, the Neshaminy soils have few limitations to use for farming, and they are suitable for many other uses. In places bedrock near the surface is a limitation in areas of Brecknock soils.

11. Athol Association

Deep, well-drained, reddish soils that are undulating or rolling and formed in material weathered from calcareous conglomerate

This association consists of undulating or rolling soils and of areas containing many outcrops of limestone conglomerate rock. It is mainly in the southeastern part of the county near Seyfert and Weavertown, but one area is in the eastern part near Bally. The association makes up about 1 percent of the county.

About 85 percent of the association consists of Athol soils. These are deep, well-drained, reddish silt loams that have high available moisture capacity and moderate natural fertility.

Practically all of this association is farmed. Except where the limestone ledges occur, the soils have few limitations if used for crops and for other uses. Wells in this area can become polluted, however, by drainage into the solution channels in the underlying bedrock.

Use and Management of Soils

The soils of Berks County are used for grain and food crops, pasture, and trees. This section explains how the soils can be used for these main purposes and still be conserved for future needs. It also discusses use of the soils for wildlife habitat, as woodland, for engineering purposes, and for community development.

Use and Management of Soils for Crops and Pasture

The system of capability classification used by the Soil Conservation Service is explained in this part of the sur-

Figure 4.—**Typical landscape of Neshaminy, Brecknock, and Penn soils. The Neshaminy soils are on the upper wooded slopes, and the Brecknock soils are on the lower wooded slopes in the background. Penn soils are in the field in the foreground.**

vey, and the soils are grouped in capability units so that the management of similar soils can be discussed in one place. Productivity ratings are also given for crops commonly grown on each of the soils in the county.

Capability groups of soils

The capability classification is a grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to most horticultural crops or to rice and other crops that have special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive land-forming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit.

These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. Classes are defined as follows:

Class I. Soils have few limitations that restrict their use.

Class II. Soils have some limitations that reduce the choice of plants or require moderate conservation practices.

Class III. Soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Class IV. Soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in Berks County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other response to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIw-1. Thus, in one symbol, the Roman numeral designates the capability class or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages, each of the capability units in Berks County is described, and suggestions for the use and management of the soils in each unit are given. The Made land mapping units were not placed in a capability unit, because they are too variable for such placement to be feasible. The names of the soil series represented are mentioned in the description of each unit, but that does not mean that all the soils in a given series are in the unit. The capability classification of each individual soil is given in the "Guide to Mapping Units" near the back of this survey.

The cropping systems suggested for the soils in the capability units are described according to intensity, and the terms "high," "medium," "low," or "very low" are used. Examples of the kind of rotation meant for each degree of intensity follow:

1. Rotation of high intensity: 1 year of a row crop with a winter cover crop followed by 1 year of a row crop, 1 year of a small grain, and 1 year of hay or pasture in a 4-year rotation.
2. Rotation of medium intensity: 1 year of a row crop followed by 1 year of a small grain and 1 year of hay in a 3-year rotation.
3. Rotation of low intensity: 1 year of a row crop followed by 1 year of a small grain and 2 or 3 years of hay in a 4- or 5-year rotation.
4. Rotation of very low intensity: 1 year of a row crop followed by 1 year of a small grain and 3 or more years of hay in a rotation of 5 or more years.

Rotations are modified, depending on the needs of the landowner and the kind of practices used in a specific field to conserve moisture and to protect the soils from erosion. Contour stripcropping, terracing, and establishing sod waterways on sloping soils are among the practices that can be used to conserve moisture and to protect the soils. Where the soils are wet, crops generally need to be planted in graded strips; terraces and grassed waterways also help to remove excess surface water and to control erosion. Where suitable outlets are available, subsurface water generally can be removed by installing random tile drains or by digging open ditches.

Some practices reduce erosion, help to maintain the content of organic matter, and improve the structure of the soils. Among these are the use of cover crops over winter, stubble mulching, practicing minimum tillage, and growing a green-manure crop if a rotation of high intensity is used or where cultivated crops are grown year after year. Lime and fertilizer should be applied according to the needs indicated by the results of soil tests and according to the kind of crop to be grown.

Additional help in managing the soils can be obtained by consulting the local representative of the Soil Conservation Service, the county agricultural agent, or a member of the staff of the State Agricultural Experiment Station.

CAPABILITY UNIT I-1

This unit consists of deep, well-drained, level or nearly level soils of the Duffield, Fogelsville, Murrill, and Washington series. These soils have formed mainly in material weathered from limestone or in mixed material high in content of lime.

Permeability is moderate, and the available moisture capacity is high. Reaction ranges from moderately acid to neutral.

These soils are easily cultivated and are suited to most of the crops commonly grown in the county. Because they are only slightly susceptible to erosion, a rotation of high intensity is suitable. A high content of organic matter should be maintained. Crops respond well to a high level of management.

CAPABILITY UNIT I-2

Pope silt loam is the only soil in this capability unit. It is a deep, well-drained, level or nearly level soil formed in alluvial sediment derived from acid sandstone, shale, and gneiss.

Permeability is moderate to moderately rapid, and the available moisture capacity is moderate to high. Reaction ranges from medium acid to very strongly acid.

This soil is suited to most of the crops commonly grown in the county. It is only slightly susceptible to erosion. Therefore, a rotation of high intensity is suitable. A cover crop should be grown to provide protection in winter when the hazard of flooding is greatest.

CAPABILITY UNIT IIe-1

This unit consists of deep, well-drained, moderately eroded soils that have a medium-textured surface layer. These soils are in the Athol, Birdsboro, Duffield, Fogelsville, Hagerstown, Murrill, Neshaminy, and Washington series. The residuum in which they formed has weathered mainly from limestone or other basic material. In general, these soils are nearly level or gently sloping, but a few are sloping. A few small nearly level areas have had the surface layer stripped for use in mushroom beds.

Runoff is medium or slow in most places, and the hazard of further erosion is generally moderate. Permeability is moderate in most places, and the available moisture capacity is generally high. Natural fertility is high. Reaction ranges from moderately acid to neutral. The high content of gravel in some of the soils causes severe wear to equipment used for tillage.

Soils of this unit are suited to most of the crops commonly grown in the county. They need to have the content of organic matter maintained, however, to keep them in good tilth. A rotation of medium intensity should be used to help keep the soils productive. Also needed are practices that protect the soils from erosion and that conserve moisture.

CAPABILITY UNIT IIe-2

This capability unit consists of deep, well-drained, medium-textured soils of the Allenwood, Bedington, Chester, Edgemont, and Laidig series. The soils have formed in acid material or in material that is low in content of lime. Most of the soils are gently sloping, and most are moderately eroded.

Runoff is medium, and the hazard of further erosion is moderate to slight. Permeability is moderately slow to moderately rapid, and the available moisture capacity is moderate to high. Reaction is slightly acid where the soils have received lime. It is very strongly acid where no lime has been applied.

These soils are suited to most of the crops commonly grown in the county. They are productive if a rotation of medium intensity and suitable conservation practices are used. The content of organic matter should be maintained to keep them in good tilth.

CAPABILITY UNIT IIe-3

Wiltshire silt loam, 3 to 8 percent slopes, moderately eroded, is the only soil in this capability unit. It is a deep, moderately well drained, gently sloping soil that has formed in material from limestone and calcareous shale.

Surface runoff is slow to medium, and the hazard of further erosion is slight to moderate. The available moisture capacity is moderate to high. Soil reaction is generally neutral or slightly acid where this soil has received lime. It is medium acid where no lime has been applied.

This soil is not suited to crops that are susceptible to winterkill or that are intolerant of wetness caused by the seasonal high water table. A rotation of medium intensity and practices that safely dispose of the excess surface water help to control further erosion.

CAPABILITY UNIT IIe-4

In this capability unit are mostly deep, moderately well drained, gently sloping, and moderately eroded soils that have formed in material weathered from acid sandstone, shale, and gneiss. These soils are in the Buchanan, Comly, Glenville, and Readington series. In most of them, a slowly permeable layer between a depth of 20 and 30 inches restricts the movement of water and air and retards the penetration of roots.

Surface runoff is slow to medium, and the hazard of further erosion is moderate or slight. Permeability is generally slow or moderately slow, and the available moisture capacity is generally moderate. Reaction is slightly acid where the soils have received lime. It is strongly acid where no lime has been applied.

These soils are not suited to crops that are susceptible to winterkill or that do not tolerate excess wetness caused by the seasonal high water table. A rotation of medium intensity provides protection from erosion and conserves water. Needed practices are ones that safely dispose of the excess surface water without causing erosion.

CAPABILITY UNIT IIe-5

This capability unit consists of shallow and moderately deep, well-drained, nearly level or gently sloping soils that have formed mainly in material weathered from acid sandstone and shale. These soils are in the Berks, Brandywine, Brecknock, Litz, Penn, Ryder, and Weikert series.

Surface runoff is medium to slow, and there is a moderate or slight hazard of further erosion. In most places permeability is moderate or moderately rapid, and the available moisture capacity is generally moderate to low. Soil reaction is slightly acid where the soils have received lime. It is very strongly acid where no lime has been applied.

The soils of this unit are suited to most of the crops commonly grown in the county, but they are somewhat droughty, as well as susceptible to further erosion. A rotation of medium intensity gives protection from erosion and helps to conserve water. Practices are needed that safely dispose of the excess surface water without causing erosion.

CAPABILITY UNIT IIs-1

Only Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded, is in this capability unit. It is a deep, well-drained, moderately coarse textured, gently sloping soil that has formed mainly in material weathered from red, acid sandstone and conglomerate.

This soil tends to be droughty. Shale has weathered in many places, however, to make it less droughty than it would be otherwise. Permeability is moderately rapid,

and the available moisture capacity is moderate to high. Reaction is slightly acid where this soil has received lime. It is strongly acid where no lime has been applied.

This soil is suited to most of the crops commonly grown in the county. It is not well suited to crops that grow mainly late in spring and in summer, however, for those crops are adversely affected by short periods of drought. A rotation of medium intensity helps to maintain the content of organic matter. The organic matter, in turn, helps to keep this soil in good tilth and increases the rate of infiltration. This kind of rotation also helps to conserve moisture, and it provides protection from erosion.

CAPABILITY UNIT IIs-2

This capability unit consists of Berks and Ryder soils, which are moderately deep, well drained, and nearly level. These soils have formed in material weathered from neutral or calcareous shale, siltstone, or shaly limestone.

Surface runoff is slow, and the hazard of further erosion is slight. The available moisture capacity is low to moderate, and natural fertility is moderate to low. Reaction is medium acid to strongly acid.

The soils of this unit are suitable for cultivated crops, but a rotation of medium intensity should be used. This kind of rotation helps to maintain the content of organic matter and to keep the soils in good tilth. Returning crop residue to these soils, where practical, is also a desirable practice.

CAPABILITY UNIT IIw-1

In this capability unit are deep, moderately well drained, level or nearly level soils of the Comly, Glenville, Raritan, Readington, Watson, and Wiltshire series. These soils have formed in material weathered from acid and basic rocks.

Surface runoff is generally slow, and the hazard of erosion is slight in most places. The water table is high during some seasons. A slowly permeable layer, generally below a depth of 24 inches, restricts the movement of air and water and has an adverse effect on deep-rooted crops. Permeability and internal drainage are slow. Reaction is neutral or slightly acid where the soils have received lime. It is strongly acid where no lime has been applied.

Wetness is the major hazard to crops grown on these soils, but erosion occurs in some areas where the slopes are between 2 and 3 percent. The soils are suited to many of the crops commonly grown in the county. Plants that winterkill, however, or that do not tolerate wetness caused by the high water table, will not grow well. A rotation of medium intensity is suitable, for such a rotation helps to maintain the content of organic matter and favorable soil structure. Terraces, outlets, and open ditches or tile drains increase the suitability of these soils for crops. They also allow earlier preparation of the seedbed in spring than is possible on wet soils.

CAPABILITY UNIT IIw-2

This capability unit consists of deep, moderately well drained, nearly level silt loams and loams of the Lindside, Philo, and Rowland series. These soils have formed in alluvial sediment derived from acid and calcareous rocks. They are on the flood plains of streams; damaging flooding occurs occasionally when crops are in the fields.

Surface runoff is slow, and the water table is high during some seasons. The hazard of erosion is slight, except for stream gouging during floods. Permeability is moderate in most places, and the available moisture capacity is generally high. Soil reaction is slightly acid where the soils have received lime. It is strongly acid where no lime has been applied.

The seasonal high water table and occasional flooding require the use of a rotation of medium intensity that will protect these soils from erosion. During winter, a cover crop should be maintained to give protection from stream gouging during floods. Suitable crops are ones that tolerate wetness. In places artificial drainage is needed to make these soils more suitable for crops and to permit working the soils in time for planting in spring.

CAPABILITY UNIT IIIe-1

Deep, well-drained, sloping, moderately eroded soils of the Athol, Duffield, Fogelsville, Hagerstown, Murrill, Neshaminy, and Washington series are in this capability unit. These soils have formed in material weathered from limestone and other basic rocks. Rock ledges are common in the areas of Athol and Hagerstown soils, and sinkholes are common in the areas of Hagerstown soil. The Murrill soil is gravelly.

Surface runoff is medium to rapid, and the hazard of further erosion is severe. Permeability is moderate, and the available moisture capacity is high. Reaction is slightly acid to neutral where these soils have received lime. It is medium acid where no lime has been applied.

The soils of this unit are suited to most of the crops commonly grown in the county. Because of past erosion and the hazard of further erosion, a rotation of low intensity is suitable. Practices are needed that help to control erosion, and these practices also conserve soil moisture.

CAPABILITY UNIT IIIe-2

This capability unit consists of deep, well-drained, sloping soils of the Bedington, Chester, Edgemont, and Laidig series. These soils have formed in material that weathered from acid shale, gneiss, and sandstone, and they are moderately eroded. Most of the soils contain many coarse fragments, and the Chester and Edgemont soils contain many outcrops of rock.

Runoff is rapid, and the hazard of further erosion is severe in many places. Permeability is moderately slow to moderately rapid, and the available moisture capacity is moderate. Soil reaction is slightly acid where the soils have received lime. It is very strongly acid where no lime has been applied.

The soils of this unit are suited to most of the crops commonly grown in the county. Because of past erosion and the hazard of further erosion, a rotation of low intensity is desirable. Needed erosion control practices are ones that conserve the soils and the supply of moisture.

CAPABILITY UNIT IIIe-3

In this capability unit are moderately deep, well-drained, sloping soils of the Berks, Brandywine, Brecknock, Litz, and Penn series. These soils have formed in material weathered from rocks that are generally acid. They are moderately eroded.

Runoff is medium to rapid, and there is a severe hazard of further erosion. Permeability is moderate to moderately rapid, and the available moisture capacity is low to moderate. Reaction is slightly acid where the soils have received lime. It is strongly acid where no lime has been applied.

These soils are suited to most of the crops commonly grown in the county, but crops that grow mainly late in spring and in summer are adversely affected by short periods of drought. Past erosion and the risk of further erosion are the major hazards where crops are grown. A crop rotation of low intensity should be used to protect the soils and to conserve moisture. Also needed are practices that control erosion.

CAPABILITY UNIT IIIe-4

This capability unit consists of shallow and moderately deep, well-drained, gently sloping and sloping shaly silt loams of the Berks, Klinesville, and Weikert series. These soils are moderately eroded. They have formed in material that weathered from acid or calcareous shale.

Surface runoff is medium to rapid, and the hazard of further erosion is severe. Permeability is moderately rapid, and the available moisture capacity is low or very low. Soil reaction is slightly acid where these soils have received lime. It is strongly acid where no lime has been applied.

These soils are suitable for most crops commonly grown in the county, but short periods of drought adversely affect most crops. The severe hazard of further erosion and the unfavorable moisture capacity are the major limitations to use of these soils for crops. A crop rotation of low intensity should be used to protect the soils and to conserve moisture. Erosion control practices are also needed.

CAPABILITY UNIT IIIe-5

Only Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded, is in this capability unit. It is a deep, well-drained, sloping soil that formed in material weathered from red sandstone and conglomerate.

Runoff is medium, and the hazard of further erosion is severe. Permeability is moderately rapid, and the available moisture capacity is moderate. Reaction is slightly acid where this soil has received lime. It is very strongly acid where no lime has been applied.

This soil is suited to the general farm crops commonly grown in the county. Further erosion is a hazard, however, and this soil tends to be droughty. A suitable crop rotation is one of low intensity that provides protection from erosion and that conserves moisture.

CAPABILITY UNIT IIIw-1

This capability unit consists of deep or moderately deep, moderately well drained or somewhat poorly drained, nearly level or gently sloping soils of the Lehigh and Readington series. These soils have formed in material that weathered from red, calcareous shale or dark-gray, generally acid, metamorphosed shale and fine-grained sandstone.

Surface runoff is slow to medium, and the available moisture capacity is moderate to low. Soil reaction is slightly acid to strongly acid.

Wetness during spring and winter makes these soils poorly suited to deep-rooted crops or to crops that are susceptible to winterkill. Also, droughtiness is a limitation to growing crops in summer. A suitable rotation is one of low intensity that will conserve organic matter, protect the soils from erosion, and maintain favorable soil structure. Practices that safely remove the surface water and that help to control erosion are needed with this rotation.

CAPABILITY UNIT IIIw-2

In this capability unit are deep, poorly drained, nearly level soils of the Atkins, Bowmansville, and Melvin series. These soils have formed in alluvial sediment derived from acid and calcareous rocks. They occur on the flood plains of streams, where damaging floods occasionally occur when crops are in the fields.

Surface runoff is slow, and the water table is high. The hazard of erosion is slight, except for stream gouging during floods. Permeability is moderate to moderately slow, and the available moisture capacity is high. Soil reaction is slightly acid where these soils have received lime. It is strongly acid where no lime has been applied.

Occasional flooding and the high water table require the use of a rotation of low intensity that will protect these soils. A cover crop should be maintained over winter to give protection from stream gouging during floods. Suitable crops are those that tolerate wetness. Drainage is needed to increase the suitability of these soils for crops and to permit working the soils at appropriate times.

CAPABILITY UNIT IVe-1

In this capability unit are deep, well-drained soils that are moderately or severely eroded and sloping to moderately steep. These soils have formed in material weathered from limestone or other basic rocks. They are in the Athol, Duffield, Hagerstown, and Neshaminy series.

Surface runoff is medium to rapid or very rapid, and the hazard of further erosion is very severe. Permeability is generally moderate. The available moisture capacity is high. In many places where they have been limed, these soils are slightly acid or neutral in reaction, but they are medium acid in other areas. Ledges of rock are common. In some places sinkholes are a hazard to farming and to the subsurface water supply.

Past erosion and the hazard of further erosion make the soils of this unit only fairly suitable for cultivation. The kind of cropping system needed is one of very low intensity that will help to control erosion, to conserve moisture, and to maintain the content of organic matter. Surface water should be controlled and diverted from the long slopes.

CAPABILITY UNIT IVe-2

Deep, well-drained, sloping and moderately steep soils that are moderately or severely eroded are in this capability unit. These soils are in the Bedington, Chester, Edgemont, and Lewisberry series. They have formed in material weathered from shale, sandstone, quartzite, and gneiss.

Surface runoff is rapid or very rapid, and the hazard of further erosion is severe. Permeability is moderately rapid, and the available moisture capacity is moderate to high. Reaction is medium acid to very strongly acid.

A suitable rotation for these soils is one of very low intensity, or hay crops should be grown for long periods. Needed practices are ones that safely dispose of excess surface water and thus help to control erosion and conserve moisture.

CAPABILITY UNIT IVe-3

This capability unit consists of deep to shallow, well-drained, sloping to moderately steep soils of the Berks, Brandywine, Klinesville, Lehigh, Litz, Penn, and Ryder series. These soils are moderately or severely eroded. They have formed in material weathered from shale and sandstone.

Surface runoff is rapid or very rapid, and the hazard of further erosion is very severe. The available moisture capacity is moderate to low. Reaction is slightly acid, where the soils have received lime, to very strongly acid, where no lime has been applied.

The moderately steep slopes and hazard of further erosion are very severe limitations to use of these soils for crops. A rotation of very low intensity should be used to protect the soils and to conserve moisture. In addition, erosion control practices are required.

CAPABILITY UNIT IVw-1

This capability unit consists of deep, poorly drained soils that are nearly level or gently sloping. These soils have formed in material weathered from shale, sandstone, limestone, and conglomerate. They are in the Brinkerton, Croton, and Lamington series, and they also include a gray surface variant of the Burgin series.

Surface runoff is slow, and the hazard of erosion is slight to moderate. Permeability is slow, and the available moisture capacity is high. Reaction is slightly acid to neutral in the Burgin variant, which formed in material derived from limestone. It is medium acid to very strongly acid in the other soils.

Poor drainage and slow permeability make these soils only fairly suitable for farming. A suitable crop rotation is one of very low intensity that will maintain the content of organic matter, maintain favorable soil structure, and reduce damage from erosion. Surface drains make these soils more suitable for farming.

CAPABILITY UNIT Vw-1

Only Baile silt loam is in this capability unit. It is a deep, poorly drained, nearly level soil formed in material weathered from bedrock and in colluvium derived from granitic gneiss.

Surface runoff is slow, and the hazard of erosion is slight. Permeability is slow, and the available moisture capacity is high. In some places where this soil has received lime, it is neutral in reaction. Reaction ranges from neutral to strongly acid, however, depending on the amount of lime that has been applied.

This soil is well suited to pasture, trees, and food and cover for wildlife. The grasses and legumes that grow best on it are those that tolerate excess moisture. Where surface and subsurface drains can be installed, they increase suitability for crops and facilitate harvesting of crops and management of pastures.

CAPABILITY UNIT VIe-1

This capability unit consists of well-drained, moderately steep, severely eroded soils of the Athol, Chester, Duffield, Hagerstown, Lewisberry, and Neshaminy series. These soils have formed in material derived from limestone, gneiss, sandstone, and shale. The areas contain many rock ledges.

Runoff is rapid, and the hazard of further erosion is severe. Permeability is moderate, and the available moisture capacity is moderate to high. Soil reaction is slightly acid where these soils have received lime, to strongly acid, where no lime has been applied.

CAPABILITY UNIT VIe-2

In this capability unit are shallow, moderately deep or deep, well-drained, sloping to steep soils that have formed in material derived from shale and sandstone. These soils are in the Berks, Brecknock, Klinesville, and Weikert series. They are moderately or severely eroded.

Surface runoff is rapid, and the hazard of further erosion is severe. Permeability is moderately rapid or rapid, and the available moisture capacity is low. Reaction ranges from medium acid to very strongly acid.

The soils of this unit are generally not suited to crops, but they may be used for pasture if they are properly managed. Good management includes mowing, seeding of desirable species of grasses and legumes, and applying fertilizer.

CAPABILITY UNIT VIs-1

This capability unit consists of deep and moderately deep, well drained and moderately well drained, very stony soils of the Athol, Brecknock, Buchanan, Chester, Edgemont, Dekalb, Laidig, Lewisberry, Murrill, and Neshaminy series. These soils are nearly level to moderately steep. They have formed in material derived from limestone, sandstone, shale, quartzite, gneiss, and diabase.

Surface runoff is slow to rapid, and the hazard of erosion is severe. Available moisture capacity is moderate to high. Reaction ranges from medium acid to strongly acid.

The soils of this unit are generally too stony to be suitable for field crops or for pasture of good quality. They may be used for pasture, however, where they have been cleared of trees, and they are suitable for trees or for wildlife habitat. For best returns, good management is necessary if the soils are used for any of these purposes.

CAPABILITY UNIT VIIe-1

Lewisberry gravelly sandy loam, 25 to 35 percent slopes, severely eroded, is the only soil in this capability unit. It is a deep soil formed in material that weathered from acid sandstone and conglomerate.

Surface runoff is rapid or very rapid, and the hazard of further erosion is severe. Permeability is moderately rapid, and the available moisture capacity is moderate to high. Soil reaction is strongly acid or very strongly acid. Natural fertility is low.

The severe past erosion and hazard of further erosion limit the use of this soil to growing trees that can be managed for the production of timber, for wildlife habitat, and for recreational purposes. The cover of plants

should be protected from fire and grazing, and other woodland management should be practiced.

CAPABILITY UNIT VIIe-2

Shallow and moderately deep, well-drained, moderately steep and steep soils of the Berks, Klinesville, Litz, and Weikert series are in this capability unit. These soils have formed in material weathered from acid shale and sandstone. They are moderately or severely eroded.

Runoff is rapid or very rapid, and the hazard of further erosion is severe or very severe. Permeability is moderately rapid, and the available moisture capacity is low. Soil reaction is strongly acid or very strongly acid. Natural fertility is low.

Past erosion and the hazard of further erosion limit the safe use of these soils to growing woody plants that provide a permanent cover. The soils are suited to the production of trees that provide wood, provide food and cover for wildlife, and enhance the areas for recreation. The timber should be managed so that a cover is maintained and desirable kinds of trees are encouraged. Also, the trees need protection from fire and grazing.

CAPABILITY UNIT VIIs-1

Moderately deep or deep, well-drained, very stony, steep or very steep soils are in this capability unit. These soils are in the Brecknock, Chester, Edgemont, Dekalb, Lewisberry, and Neshaminy series. They have formed in material weathered from acid sandstone, conglomerate, and basic rocks.

Surface runoff is very rapid, and the hazard of erosion is very severe. Permeability is moderate to moderately rapid, and the available moisture capacity is moderate to low. These soils are strongly acid or very strongly acid.

Stoniness and steep or very steep slopes limit the use of these soils to growing trees for the production of timber, for wildlife habitat, for recreational uses, or for protection of the watershed. Most of the soils are so stony that returns from timber production are only marginal. The forests need protection from fire and from grazing by cattle.

CAPABILITY UNIT VIIs-2

This capability unit consists of deep, poorly drained, very stony, nearly level or gently sloping soils of the Andover and Baile series. These soils have formed in colluvium and alluvium derived from acid and basic rocks.

Surface runoff is slow, and the hazard of erosion is slight. The available moisture capacity is generally high. Soil reaction is medium acid to strongly acid.

Stoniness and poor drainage generally limit the use of these soils to growing trees that provide timber and also food and cover for wildlife. The trees need protection from fire and grazing.

CAPABILITY UNIT VIIIs-1

Only one miscellaneous land type, Rubble land, is in this capability unit. The areas contain little or no soil material. This land is so stony that the growth of trees, shrubs, and forbs is extremely limited.

Productivity ratings

Table 1 shows, by relative numbers, estimated productivity ratings of the soils of Berks County for specified crops, and it also indicates suitability of the soils for orchards. Each rating of relative productivity denotes comparative yields of the soil for the specified crop in relation to a standard index of 100. The standard index represents the average yield per acre obtained on the most productive soils of the county during the past 10 years. The average acre yield represented by the standard index is given at the head of the column for each crop.

For field crops and forage crops, the productivity ratings are given for two levels of management. In columns A are the ratings to be expected under the average management commonly practiced on most farms in the county. In columns B are ratings that indicate yields that may be obtained in an average growing season if improved management is practiced. They generally represent an increase over present yields. Improved management consists of planting adapted varieties of crops; applying fertilizer and lime in the amounts indicated by the results of soil tests; using currently recommended practices that control weeds, insects, and diseases; and using practices that help to control erosion and that safely remove excess surface water and excess water in the soils. The practices that help to control erosion include minimum tillage, contour tillage, stripcropping, good management of crop residue, drainage, and use of diversions and waterways. Other practices may be suggested by representatives of the Agricultural Extension Service and the Soil Conservation Service in this county. Irrigation was not considered in obtaining the ratings.

For any soil in table 1, the actual estimated yield of a specified crop may be determined by multiplying the rating of relative productivity for the soil by the yield represented by 100 at the head of the crop column, and then dividing the product by 100. For example, Washington silt loam, 3 to 8 percent slopes, moderately eroded, under the A level of management, has a rating of 95 for corn grown for grain. By multiplying 95 by 80 (head of the column for corn) and dividing by 100, we get 76. Therefore, the annual acre yield of corn grown for grain on Washington silt loam, 3 to 8 percent slopes, moderately eroded, under the A level of management is 76 bushels per acre.

Under the B level of management, this same soil has a productivity rating of 155 for corn grown for grain. By multiplying 155 by 80 and dividing the product by 100, we get 124. This means that yields per acre on Washington silt loam, 3 to 8 percent slopes, moderately eroded, can equal 124 bushels of corn grown for grain. No ratings are given in table 1 for soils that are not suited to the crops rated.

The yields obtained from the productivity ratings given in table 1 do not indicate the maximum yields that can be obtained. Rather, they indicate average yields that can be obtained over a period of time. Yields are expected to increase as new methods and new varieties of crops are developed, but the relative yields on different soils are not expected to change.

TABLE 1.—*Estimated productivity ratings for soils used for field crops*

[In columns A are productivity ratings for soils under ordinary management, and in columns B are productivity ratings under

Soils	Corn: Grain (100=80 bu. per acre) A	Corn: Grain (100=80 bu. per acre) B	Corn: Silage (100=16 tons per acre) A	Corn: Silage (100=16 tons per acre) B	Oats (100=40 bu. per acre) A	Oats (100=40 bu. per acre) B	Wheat (100=35 bu. per acre) A	Wheat (100=35 bu. per acre) B
Allenwood gravelly silt loam, 2 to 8 percent slopes	75	150	75	150	90	170	60	115
Andover very stony loam, 0 to 8 percent slopes								
Athol silt loam, 3 to 8 percent slopes, moderately eroded	95	155	95	155	100	180	75	125
Athol silt loam, 8 to 15 percent slopes, moderately eroded	90	150	90	150	90	170	75	115
Athol silt loam, 8 to 15 percent slopes, severely eroded					75	145	55	105
Athol silt loam, 15 to 25 percent slopes, severely eroded								
Athol very stony and rocky silt loam, 8 to 25 percent slopes								
Atkins silt loam								
Baile silt loam								
Baile very stony silt loam								
Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded.	75	150	75	150	75	170	75	125
Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded.	70	135	70	135	75	155	70	115
Bedington shaly silt loam, 15 to 25 percent slopes, moderately eroded.					75	135	60	100
Berks shaly silt loam, 0 to 3 percent slopes, moderately eroded.	60	110	60	110	85	135	75	95
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded.	55	105	55	105	75	135	60	90
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded.	45	95	45	95	60	125	55	90
Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded.					55	115	50	80
Berks shaly silt loam, 25 to 35 percent slopes, moderately eroded.								
Birdsboro silt loam, 2 to 10 percent slopes	75	145	75	145	90	180	70	125
Birdsboro-Duffield silt loams, 3 to 10 percent slopes	70	145	75	145	100	180	70	125
Bowmansville silt loam								
Brandywine channery loam, 3 to 8 percent slopes, moderately eroded.	45	95	45	95	50	135	50	90
Brandywine channery loam, 8 to 15 percent slopes, moderately eroded.	45	85	45	85	50	125	45	90
Brandywine channery loam, 15 to 25 percent slopes, moderately eroded.					45	115	35	85
Brecknock channery silt loam, 3 to 8 percent slopes	50	110	50	110	60	145	45	105
Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded.	50	105	50	105	60	135	45	90
Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded.								
Brecknock very stony silt loam, 0 to 8 percent slopes								
Brecknock very stony silt loam, 8 to 25 percent slopes								
Brecknock very stony silt loam, 25 to 60 percent slopes								
Brinkerton silt loam, 0 to 3 percent slopes		100		100		135		
Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded.		100		100		135		
Buchanan gravelly loam, 3 to 8 percent slopes	80	115	80	115	75	145	55	100
Buchanan very stony loam, 0 to 8 percent slopes								
Burgin silt loam, gray surface variant		100		100		135		
Chester channery silt loam, 3 to 8 percent slopes, moderately eroded.	80	160	80	160	75	180	85	135
Chester channery silt loam, 8 to 15 percent slopes, moderately eroded.	75	150	75	150	75	170	80	115
Chester channery silt loam, 8 to 15 percent slopes, severely eroded.					60	145	75	105
Chester channery silt loam, 15 to 25 percent slopes, moderately eroded.					75	150	75	105
Chester channery silt loam, 15 to 30 percent slopes, severely eroded.								
Chester very stony silt loam, 0 to 8 percent slopes								
Chester very stony silt loam, 8 to 25 percent slopes								
Chester very stony silt loam, 25 to 55 percent slopes								
Comly silt loam, 0 to 3 percent slopes	55	115	55	115	75	145	55	100

See footnote at end of table.

and forage crops, and suitability ratings for soils used for orchards

improved management. Absence of data indicates that the soil is not suited to the specified crop at the specified level of management]

Barley		Potatoes		Hay				Pasture				Suitability for orchards
(100=40 bu. per acre)		(100=400 bu. per acre)		Alfalfa and grass mixture (100=3 tons per acre)		Grass-legume mixture (100=3 tons per acre)		Bluegrass (100=50 cow-acre-days[1])		Tall grass (100=100 cow-acre-days[1])		
A	B	A	B	A	B	A	B	A	B	A	B	
75	150	80	150	70	140	55	105	160	300	140	250	Good.
85	160	75	150	90	165	65	115	175	280	175	275	Good.
85	150	75	145	90	160	70	110	160	280	150	250	Good.
75	140			75	135	60	90	150	235	140	220	Good.
								120	200			
								90	200			
						70	100	175	245	100	170	
								85				
75	150	90	150	80	155	55	105	150	280	125	250	Good.
75	140	90	150	75	150	55	100	150	280	130	240	Good.
75	135			75	145	50	95	145	240	125	235	Fair.
85	135	60	120	55	110	55	100	130	250	95	180	Fair.
75	125	60	120	55	105	50	85	120	235	85	175	Fair.
60	110	60	115	50	100	45	75	110	250	85	170	Fair.
50	100			45	100	40	75	110	200	80	160	
								110	175			
85	150	85	150	85	160	60	110	150	280	140	250	Good.
90	150	85	150	85	160	65	115	160	280	150	250	Good.
						65	105	180	280	110	175	
50	100	65	120	65	125	40	90	130	260	100	200	Fair.
50	100	55	110	50	115	35	85	110	245	80	180	Fair.
50	90			50	115	30	75	100	200	70	170	
60	120	65	125	70	125	45	95	170	260	100	200	Fair.
60	115	60	120	65	115	45	85	165	250	90	190	Fair.
								110	160			Fair.
								95				
								90				
						70	90	100	200		145	
						70	90	100	200		145	
75	125					60	105	120	240	85	175	
								75				
						50	90	140	270		155	
75	150	80	160	80	160	60	120	150	280	135	280	Good.
75	140	80	150	75	145	55	105	115	280	115	250	Good.
60	125			70	125	50	95	105	235	115	230	Good.
75	125			75	140	55	100	110	240	115	230	Good.
								90	200			Fair.
								80				
								80				
						55	100	150	265	80	175	

TABLE 1.—*Estimated productivity ratings for soils used for field crops and*

Soils	Corn				Oats		Wheat	
	Grain (100=80 bu. per acre)		Silage (100=16 tons per acre)		(100=40 bu. per acre)		(100=35 bu. per acre)	
	A	B	A	B	A	B	A	B
Comly silt loam, 3 to 8 percent slopes, moderately eroded	60	115	60	115	75	145	55	100
Croton silt loam, 0 to 3 percent slopes	--------	80	--------	80	--------	135	--------	--------
Croton silt loam, 3 to 8 percent slopes, moderately eroded	--------	85	--------	85	--------	135	--------	--------
Duffield silt loam, 0 to 3 percent slopes	100	155	100	155	100	180	100	135
Duffield silt loam, 3 to 8 percent slopes, moderately eroded	90	155	90	155	100	180	95	130
Duffield silt loam, 8 to 15 percent slopes, moderately eroded	90	150	90	150	100	170	90	115
Duffield silt loam, 15 to 25 percent slopes, moderately eroded.	--------	--------	--------	--------	85	160	85	110
Duffield and Hagerstown soils, 8 to 15 percent slopes, severely eroded.	--------	--------	--------	--------	85	150	80	100
Duffield and Hagerstown soils, 15 to 30 percent slopes, severely eroded.	--------	--------	--------	--------	--------	--------	--------	--------
Edgemont channery loam, 3 to 8 percent slopes, moderately eroded.	60	135	60	135	75	170	65	115
Edgemont channery loam, 8 to 15 percent slopes, moderately eroded.	50	125	50	125	75	160	55	105
Edgemont channery loam, 15 to 25 percent slopes, moderately eroded.	--------	--------	--------	--------	70	135	50	90
Edgemont and Dekalb very stony sandy loams, 0 to 8 percent slopes.	--------	--------	--------	--------	--------	--------	--------	--------
Edgemont and Dekalb very stony sandy loams, 8 to 25 percent slopes.	--------	--------	--------	--------	--------	--------	--------	--------
Edgemont and Dekalb very stony sandy loams, 25 to 70 percent slopes.	--------	--------	--------	--------	--------	--------	--------	--------
Fogelsville silt loam, 0 to 3 percent slopes	100	155	100	155	100	180	80	130
Fogelsville silt loam, 3 to 8 percent slopes, moderately eroded.	95	155	95	155	100	180	80	130
Fogelsville silt loam, 8 to 15 percent slopes, moderately eroded.	90	150	90	150	90	170	70	115
Glenville silt loam, 0 to 3 percent slopes	60	115	60	115	75	145	55	100
Glenville silt loam, 3 to 8 percent slopes, moderately eroded	60	115	60	115	75	145	55	100
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded.	95	155	95	155	100	180	95	130
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.	90	150	90	150	100	170	90	115
Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded.	35	70	35	70	50	125	45	70
Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded.	--------	--------	--------	--------	50	115	45	70
Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded.	--------	--------	--------	--------	--------	--------	--------	--------
Klinesville shaly silt loam, 25 to 45 percent slopes, moderately eroded.	--------	--------	--------	--------	--------	--------	--------	--------
Laidig channery loam, 3 to 8 percent slopes, moderately eroded.	75	135	75	135	75	160	70	115
Laidig channery loam, 8 to 15 percent slopes, moderately eroded.	70	125	70	125	75	145	65	105
Laidig very stony loam, 0 to 8 percent slopes	--------	--------	--------	--------	--------	--------	--------	--------
Laidig very stony loam, 8 to 25 percent slopes	--------	--------	--------	--------	--------	--------	--------	--------
Lamington silt loam	--------	80	--------	80	--------	135	--------	--------
Lehigh silt loam, 0 to 3 percent slopes	55	120	55	120	60	140	--------	--------
Lehigh silt loam, 3 to 8 percent slopes, moderately eroded	55	110	55	110	60	140	--------	--------
Lehigh silt loam, 8 to 15 percent slopes, severely eroded	--------	--------	--------	--------	50	110	--------	--------
Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded.	70	120	70	120	75	170	80	115
Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded.	55	110	55	110	70	145	70	105
Lewisberry gravelly sandy loam, 8 to 15 percent slopes, severely eroded.	--------	--------	--------	--------	60	135	60	90
Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded.	--------	--------	--------	--------	65	140	65	95
Lewisberry gravelly sandy loam, 15 to 25 percent slopes, severely eroded.	--------	--------	--------	--------	--------	--------	--------	--------
Lewisberry gravelly sandy loam, 25 to 35 percent slopes, severely eroded.	--------	--------	--------	--------	--------	--------	--------	--------

See footnote at end of table.

forage crops, and suitability ratings for soils used for orchards—Continued

Barley (100=40 bu. per acre)		Potatoes (100=400 bu. per acre)		Hay: Alfalfa and grass mixture (100=3 tons per acre)		Hay: Grass-legume mixture (100=3 tons per acre)		Pasture: Bluegrass (100=50 cow-acre-days[1])		Pasture: Tall grass (100=100 cow-acre-days[1])		Suitability for orchards
A	B	A	B	A	B	A	B	A	B	A	B	
						55	100	150	265	80	175	
						35	70	90	205		130	
						35	70	90	205		130	
100	165	90	165	90	170	70	115	210	290	155	280	Good.
90	160	85	160	85	160	65	115	200	280	150	280	Good.
90	150	80	150	85	150	65	110	200	280	150	250	Good.
75	140			80	140	65	110	200	280	140	225	Good.
75	135			75	135	60	105	200	270	130	225	Good.
								100	200			
75	125	80	150	65	140	50	105	170	280	145	245	Fair.
60	115	50	150	50	130	35	100	170	280	110	230	Fair.
50	100			50	130	30	100	160	265	100	210	Fair.
								80				
								70				
100	165	105	175	90	160	50	115	120	280	140	280	Good.
90	160	100	170	85	155	45	110	115	275	130	275	Good.
75	150	90	160	80	145	40	105	110	275	120	250	Good.
						55	100	140	260	80	180	
						55	100	140	260	80	180	
90	165	80	175	85	155	65	115	150	280	225	250	Good.
90	150	90	160	80	155	65	110	150	280	215	235	Good.
50	100			35	75	35	75	80	170	55	130	
50	100			30	75	35	65	75	160	55	130	
								50	110			
75	150	80	160	80	125	55	105	130	265	100	210	Good.
75	140	80	150	75	125	55	105	130	265	100	210	Good.
								70				
								70				
						50	75	70	110		125	
						45	115	75	250	100	180	
						45	100	75	250	100	170	
						40	80	70	240	65	150	
75	150	75	150	75	145	55	100	140	280	110	235	Good.
75	140	75	140	70	125	55	95	120	260	100	225	Good.
60	125			65	115	45	90	100	240	90	180	Fair.
70	135			70	115	50	95	110	250	100	190	Fair.
								80	200			

TABLE 1.—*Estimated productivity ratings for soils used for field crops and*

Soils	Corn: Grain (100=80 bu. per acre) A	Corn: Grain (100=80 bu. per acre) B	Corn: Silage (100=16 tons per acre) A	Corn: Silage (100=16 tons per acre) B	Oats (100=40 bu. per acre) A	Oats (100=40 bu. per acre) B	Wheat (100=35 bu. per acre) A	Wheat (100=35 bu. per acre) B
Lewisberry very stony sandy loam, 0 to 8 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----
Lewisberry very stony sandy loam, 8 to 25 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----
Lewisberry very stony sandy loam, 25 to 60 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----
Lindside silt loam	60	145	60	140	125	180	95	125
Litz shaly silt loam, 3 to 8 percent slopes, moderately eroded.	40	90	40	90	60	135	45	95
Litz shaly silt loam, 8 to 15 percent slopes, moderately eroded.	-----	-----	-----	-----	50	125	45	90
Litz shaly silt loam, 15 to 25 percent slopes, moderately eroded.					45	115	40	80
Litz shaly silt loam, 15 to 30 percent slopes, severely eroded.	-----	-----	-----	-----	-----	-----	-----	-----
Made land, granite and gneiss materials, sloping	-----	-----	-----	-----	-----	-----	-----	-----
Made land, granite and gneiss materials, strongly sloping	-----	-----	-----	-----	-----	-----	-----	-----
Made land, limestone materials, sloping	-----	-----	-----	-----	-----	-----	-----	-----
Made land, limestone materials, strongly sloping	-----	-----	-----	-----	-----	-----	-----	-----
Made land, shale and sandstone materials, sloping	-----	-----	-----	-----	-----	-----	-----	-----
Melvin silt loam	-----	-----	-----	-----	-----	-----	-----	-----
Murrill gravelly clay loam, 0 to 3 percent slopes, severely eroded.	75	150	75	150	70	170	75	115
Murrill gravelly loam, 0 to 3 percent slopes	80	155	80	155	90	175	85	125
Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded.	75	150	75	150	75	170	75	115
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.	75	145	75	145	75	160	70	110
Murrill very stony loam, 0 to 8 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----
Murrill very stony loam, 8 to 25 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----
Neshaminy silty clay loam, 8 to 15 percent slopes, severely eroded.	-----	-----	-----	-----	65	145	55	110
Neshaminy silty clay loam, 15 to 25 percent slopes, severely eroded.	-----	-----	-----	-----	-----	-----	-----	-----
Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded.	75	155	75	155	75	180	70	130
Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded.	70	145	70	145	75	170	65	115
Neshaminy very stony silt loam, 5 to 25 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----
Neshaminy very stony silt loam, 25 to 60 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----
Penn shaly soils, 3 to 8 percent slopes, moderately eroded	50	110	50	110	60	145	50	105
Penn shaly soils, 8 to 15 percent slopes, moderately eroded	45	105	45	105	60	135	45	90
Penn shaly soils, 15 to 25 percent slopes, moderately eroded	-----	-----	-----	-----	50	125	35	80
Philo loam, coal overwash	100	150	100	150	90	180	90	115
Philo silt loam	100	150	100	150	90	180	90	115
Pope silt loam	110	160	110	160	135	185	100	130
Raritan silt loam, 0 to 5 percent slopes	60	120	60	120	75	145	65	115
Readington silt loam, 0 to 3 percent slopes	60	120	60	120	75	160	65	115
Readington silt loam, 3 to 8 percent slopes, moderately eroded	60	120	60	120	75	160	65	115
Reaville shaly silt loam, 0 to 3 percent slopes, moderately eroded	55	100	55	100	60	135	-----	-----
Reaville shaly silt loam, 3 to 8 percent slopes, moderately eroded	45	90	45	90	50	135	-----	-----
Rowland silt loam	70	145	70	145	125	180	85	115
Rubble land	-----	-----	-----	-----	-----	-----	-----	-----
Ryder silt loam, 0 to 3 percent slopes, moderately eroded	95	125	95	125	100	165	95	120
Ryder silt loam, 3 to 8 percent slopes, moderately eroded	90	120	90	120	85	160	95	120
Ryder silt loam, 8 to 15 percent slopes, severely eroded	-----	-----	-----	-----	65	135	75	100
Washington silt loam, 0 to 3 percent slopes, moderately eroded.	95	155	95	155	100	185	100	130
Washington silt loam, 3 to 8 percent slopes, moderately eroded.	95	155	95	155	100	185	95	130
Washington silt loam, 8 to 15 percent slopes, moderately eroded.	90	150	90	150	95	170	90	115
Watson silt loam, 0 to 3 percent slopes	50	115	50	115	60	145	40	115
Weikert-Berks shaly silt loams, 3 to 8 percent slopes, moderately eroded.	35	95	35	95	50	120	50	90

See footnote at end of table.

forage crops, and suitability ratings for soils used for orchards—Continued

Barley		Potatoes		Hay				Pasture				
(100=40 bu. per acre)		(100=400 bu. per acre)		Alfalfa and grass mixture (100=3 tons per acre)		Grass-legume mixture (100=3 tons per acre)		Bluegrass (100=50 cow-acre-days[1])		Tall grass (100=100 cow-acre-days[1])		Suitability for orchards
A	B	A	B	A	B	A	B	A	B	A	B	
------	------	------	------	------	------	------	------	60	------	------	------	
------	------	------	------	------	------	------	------	60	------	------	------	
------	------	------	------	------	------	------	------	------	------	------	------	
------	------	------	------	------	135	95	115	150	285	160	230	
60	125	------	------	65	115	45	85	110	235	100	175	
55	100	------	------	40	100	40	80	100	230	90	170	
50	90	------	------	40	100	40	80	80	195	80	160	
------	------	------	------	------	------	------	------	------	------	------	------	
------	------	------	------	------	------	------	------	------	------	------	------	
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------	------	------	------	------	------	------	------	------	------	------	------	
------	------	------	------	------	------	------	------	------	------	------	------	
------	------	------	------	------	------	------	------	------	------	------	------	
------	------	------	------	------	------	50	90	210	260	110	170	
75	150	80	160	70	160	55	105	190	280	120	225	Good.
85	150	85	165	75	160	60	110	195	280	120	225	Good.
75	150	80	160	85	150	55	105	170	280	110	225	Good.
75	135	75	150	75	145	50	105	160	275	100	220	Good.
------	------	------	------	------	------	------	------	120	------	------	------	
------	------	------	------	------	------	------	------	110	------	------	------	
60	135	------	------	70	135	55	100	140	275	125	240	Good.
------	------	------	------	------	------	------	------	95	225	------	------	Fair.
75	150	80	160	80	160	55	105	140	280	125	280	Good.
75	150	80	155	75	150	55	105	140	280	125	250	Good.
------	------	------	------	------	------	------	60	------	------	------	------	
------	------	------	------	------	------	------	------	------	------	------	------	
60	100	60	100	60	105	45	85	130	240	85	180	Fair.
50	85	------	------	50	100	40	80	90	205	75	170	Fair.
50	85	------	------	45	100	35	75	80	160	80	150	
------	------	------	------	------	135	90	105	150	280	120	225	
------	------	------	------	------	135	95	115	150	280	160	225	
125	160	------	------	120	150	95	120	230	280	160	290	
------	------	60	110	------	------	55	100	140	270	80	210	
------	------	------	------	------	------	55	100	140	270	80	190	
------	------	------	------	------	------	55	100	140	270	80	190	
------	------	------	------	------	------	40	75	125	255	65	135	
------	------	------	------	------	------	45	75	120	245	60	130	
------	------	------	------	------	135	95	125	150	285	160	225	
------	------	------	------	------	------	------	------	------	------	------	------	
90	150	65	120	85	135	60	100	170	270	95	210	Good.
90	150	65	115	85	135	60	95	170	270	95	210	Good.
75	135	------	------	65	115	45	85	130	245	80	150	Fair.
90	165	75	155	85	160	65	115	230	285	135	280	Good.
90	160	70	150	85	160	65	115	230	285	120	280	Good.
85	150	60	135	80	145	65	110	170	280	110	230	Good.
------	------	------	------	------	------	55	100	110	250	80	155	
50	120	35	100	35	100	40	85	100	200	55	160	Fair.

TABLE 1.—*Estimated productivity ratings for soils used for field crops and*

Soils	Corn				Oats		Wheat	
	Grain (100=80 bu. per acre)		Silage (100=16 tons per acre)		(100=40 bu. per acre)		(100=35 bu. per acre)	
	A	B	A	B	A	B	A	B
Weikert-Berks shaly silt loams, 8 to 15 percent slopes, moderately eroded.	30	85	30	85	50	110	45	85
Weikert-Berks shaly silt loams, 15 to 25 percent slopes, moderately eroded.								
Weikert-Berks shaly silt loams, 25 to 60 percent slopes, moderately eroded.								
Wiltshire silt loam, 0 to 3 percent slopes	75	120	75	120	80	160	60	115
Wiltshire silt loam, 3 to 8 percent slopes, moderately eroded	75	120	75	120	80	160	60	115

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An animal unit is 1 cow, steer, horse,

Use of the Soils as Woodland [1]

A dense forest originally covered Berks County, but the virgin stands were eliminated when the land was cleared for farming and the timber was cut for commercial purposes. Now, the woodland consists of second- and third-growth stands. Because of the intensive development of the area for farming, only 32 percent of the acreage in the county is classified as commercial woodland (*17*).[2] Following are the principal forest types that make up the present woodland (*11*) and the proportionate extent of each (*17*):

	Percentage of total woodland in the county
Red oak	79
Northern red oak is predominant. Associates are black oak, scarlet oak, chestnut oak, and yellow-poplar.	
Chestnut oak	15
Chestnut oak grows in pure stands or is predominant. Common associates are scarlet oak, white oak, black oak, pitch pine, blackgum, and red maple.	
White oak	3
White oak is predominant. Associates are black oak, northern red oak, shagbark and bitternut hickories, white ash, and yellow-poplar.	
Other forest types	3

Sawtimber occupies about 33 percent of the acreage in commercial forests. Seedlings, saplings, and pole timber account for the rest of the acreage in woodland.

As a rule, thrifty stands of red oak, yellow-poplar, ash, and white pine can be grown in this county. At present, however, the composition of the stand in many wooded areas is mainly chestnut oak, scarlet oak, and red maple. Trees grow slowly on the shallow soils and on the deep, poorly drained soils.

Management of woodland

A landowner can encourage growth of desirable kinds of trees by using good woodland management. The soils and the climate of Berks County are favorable for growing trees, and help in planning improvement of wooded tracts can be obtained from a local forester. How much effort the landowner is willing to expend toward improving his wooded tracts, however, probably depends on general economic conditions and on the extent to which urban development has taken place in the area. Table 2 will help the landowner evaluate the suitability of his soils for trees.

For the soils in the county, table 2 shows the quality of the site for sugar maple, ash, upland oak, and yellow-poplar; suitable trees to favor in the present stands; and kinds of trees that are suitable for planting or seeding. It also gives ratings for seedling mortality, plant competition, equipment limitations, and the hazards of erosion and windthrow.

About 68 percent of the woodland in the county consists of soils that are rated as excellent, very good, or good sites for growing trees; about 8 percent, of soils that are rated as fair; and about 24 percent, of soils that are rated as poor. The returns from soils that are rated as excellent, very good, or good as growing sites generally justifies the expenditure of money for management purposes. Consideration should be given, however, to the potential yield, the quality of the particular species growing on the site, and the potential market for the trees. Inferior species and inferior quality of trees may prohibit the investment of money for management purposes, and the conversion of such areas to their potential capacity may not be economically sound.

Soils that are rated only fair as a growing site are the most difficult to appraise for management. Where a rating of only fair has been given, all factors relating to growing, harvesting, and selling wood products should be analyzed to determine the intensity of management that is justified.

The returns from soils that have a rating of poor as a growing site generally do not justify spending money for managing the tract to obtain wood products. Nevertheless, growing trees is generally the most practical use for these soils because such soils do not show a profitable

[1] By V. C. MILES, woodland specialist, Soil Conservation Service.
[2] Italic numbers in parentheses refer to Literature Cited, p. 125.

forage crops, and suitability ratings for soils used for orchards—Continued

Barley		Potatoes		Hay				Pasture				
(100=40 bu. per acre)		(100=400 bu. per acre)		Alfalfa and grass mixture (100=3 tons per acre)		Grass-legume mixture (100=3 tons per acre)		Bluegrass (100=50 cow-acre-days[1])		Tall grass (100=100 cow-acre-days[1])		Suitability for orchards
A	B	A	B	A	B	A	B	A	B	A	B	
50	115	--------	--------	30	85	35	75	90	180	55	150	Fair.
--------	--------	--------	--------	--------	--------	--------	--------	80	150	--------	--------	
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	
--------	--------	--------	--------	--------	--------	70	110	125	240	100	175	
--------	--------	--------	--------	--------	--------	70	110	125	240	100	175	

or mule; 5 hogs; or 7 sheep. An acre of pasture that provides 30 days of grazing for 2 cows, for example, has a carrying capacity of 60 cow-acre-days.

return if used for field crops or grass. Consequently, soils rated as poor ought to be used for trees.

In the following paragraphs, the factors that contribute to suitability of a soil for trees are discussed; quality of the site for sugar maple, ash, upland oak, and yellow-poplar is defined; and the ratings used to indicate the quality of the site are explained.

Quality of Site.—The ratings for quality of site indicate the general ability of the soils to produce timber. The ratings are based on returns from sample plots located in this county and adjacent counties. Other soils in the county that have characteristics similar to those of the soils studied were assumed to have approximately the same rating.

The yield information for yellow-poplar is based on studies made at the Central States Forest Experiment Station. Information on upland oaks is based on data by Schnur (*9*). The ratings are based on the average height attained by the dominant and codominant trees in the stand at 50 years of age. The average height of the tallest trees at this age is called the site index. Foresters who use this rating can determine the volume of timber that a normal stand will produce at different ages. Ratings for quality of the site for yellow-poplar and for upland oak are defined as follows:

Where the rating is *excellent*, the site index for yellow-poplar is 95+ and the site index for upland oaks is 85+; the annual yield of timber from yellow-poplar when the stand is 50 years of age is 32,150 board feet per acre, and that from upland oak is more than 13,750 board feet per acre.[3]

Where the rating is *very good*, the site index for yellow-poplar ranges from 85 to 94 and the site index for upland oaks ranges from 75 to 84; the annual yield of timber from yellow-poplar when the stand is 50 years of age is 24,400 board feet per acre, and that from upland oak is 13,750 board feet per acre.

Where the rating is *good*, the site index for yellow-poplar ranges from 75 to 84 and the site index for upland oak ranges from 65 to 74; the annual yield of timber from yellow-poplar when the stand is 50 years of age is 17,620 board feet per acre, and that from upland oak is 9,750 board feet per acre.

Where the rating is *fair*, the site index for yellow-poplar ranges from 65 to 74 and the site index for upland oak ranges from 55 to 64; the annual yield of timber from yellow-poplar when the stand is 50 years of age is 11,400 board feet per acre, and that from upland oak is 6,300 board feet per acre.

Where the rating is *poor*, the site index for yellow-poplar ranges from 55 to 64, and the site index for upland oak is less than 54; the annual yield of timber from yellow-poplar when the stand is 50 years of age is 5,600 board feet per acre, and that from upland oak is 3,250 board feet per acre or less.

The site indexes for other trees, for example white pine, sugar maple, ash, and larch, vary somewhat. The better sites support the tallest trees of the same species when the trees are 50 years of age. As the site quality decreases, the height of the trees decreases. More information about the site index for other kinds of trees can be obtained from the Soil Conservation Service and from the Pennsylvania Department of Forests and Waters.

Suitable Species.—In the columns that show suitable species to favor in existing stands and suitable species for planting or seeding, the trees named grow rapidly and have high economic value. In planning the management of an existing wooded area, the owner should favor the trees shown in table 2. The objectives of the landowner will determine which kinds of trees to favor when a plantation is started. The tree species suggested for planting are considered the most suitable for the stated soils.

Seedling Mortality.—This term refers to the loss of naturally occurring or planted tree seedlings resulting from unfavorable characteristics of the soil. A rating of *slight* for seedling mortality indicates that no more than 25 percent of the planted seedlings are likely to die; that satisfactory restocking from the initial planting can be expected; and that adequate restocking would ordinarily

[3] Published data for oak does not go beyond a site index of 80.

TABLE 2.—*Soil*

[The Made land mapping units (MaB, MaD, MdB, MdD, and MeB) and Rubble land (Ru) are omitted

Soils and map symbols	Quality of site for—		Suitable species—	
	Sugar maple, ash, and upland oak	Yellow poplar [1]	To favor in existing stands	For planting or seeding
Allenwood (AgB)	Good	Good	Red oak, yellow-poplar, sugar maple, ash.	White pine, larch, yellow-poplar, Norway spruce, Austrian pine, Virginia pine.
Andover (AnB)	Good	Good	Red oak, yellow-poplar, red maple, ash.	White pine, larch, white spruce.
Athol (AsB2, AsC2, AsC3, AsD3, AtD)	Very good	Very good	Red oak, yellow-poplar, black walnut, ash.	Yellow-poplar, black walnut, white pine, larch, Norway spruce.
Atkins (Au)	Excellent for pin oak; fair for all others.		Pin oak, sycamore, red maple.	White pine, Norway spruce, white spruce.
Baile (Ba, Bd)	Excellent for pin oak; fair for sugar maple, ash, and upland oak.		Pin oak, red maple, sycamore.	White pine, Norway spruce, white spruce.
Bedington (BeB2, BeC2, BeD2)	Very good	Very good	Red oak, yellow-poplar, black walnut, ash.	Yellow-poplar, white pine, larch, Norway spruce.
Berks (BkA2, BkB2, BkC2, BkD2, BkE2)	Good		Red oak, scarlet oak, black oak, white pine, Virginia pine.	Virginia pine, white pine, larch, Norway spruce.
Birdsboro (BlB) Birdsboro and Duffield (BmB)	Very good	Very good	Yellow-poplar, black walnut, ash, red oak.	White pine, yellow-poplar, black walnut, larch, Norway spruce.
Bowmansville (Bo)	Excellent for pin oak; fair for sugar maple, ash, and upland oak.		Pin oak, red maple, sycamore.	White pine, white spruce.
Brandywine (BrB2, BrC2, BrD2)	Good		Red oak, yellow-poplar, Virginia pine, white pine.	White pine, larch, Norway spruce, Virginia pine.
Brecknock (BsB, BsC2, BsD3, BtB, BtD, BtF)	Fair		Red oak, black oak, Virginia pine.	Virginia pine, white pine.
Brinkerton (BuA, BuB2)	Good	Good	Red oak, yellow-poplar, ash, red maple.	White pine, larch, white spruce.
Buchanan (BvB, BwB)	Good	Good	Red oak, white oak, yellow-poplar, ash, sugar maple.	White pine, yellow-poplar, larch, Norway spruce.
Burgin, gray surface variant (By)	Excellent for pin oak; fair for sugar maple, ash, and upland oak.		Pin oak, sycamore, red maple.	White pine, Norway spruce, white spruce.
Chester (ChB2, ChC2, ChC3, ChD2, ChE3, CnB, CnD, CnF).	Very good	Very good	Red oak, yellow-poplar, black walnut, ash.	Yellow-poplar, black walnut, white pine, larch, Norway spruce.

See footnote at end of table.

interpretations for woodland

from this table because they are not suitable for the commercial growing of trees]

Management problems				
Seedling mortality	Plant competition	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate for conifers; slight for hardwoods.	Slight	Slight	Slight.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Moderate.
Slight, except for AtD; moderate for AtD.	Severe for conifers; severe for hardwoods.	Slight, except for AtD; moderate for AtD.	Slight, except for AtD; moderate for AtD.	Slight.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Moderate.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Slight, except for BeD2; moderate for BeD2.	Slight, except for BeD2; moderate for BeD2.	Slight.
Moderate	Slight for conifers grown on BkA2, BkB2, and BkC2; moderate for conifers grown on BkD2 and BkE2; slight for hardwoods.	Slight for BkA2, BkB2, and BkC2; moderate for BkD2; severe for BkE2.	Slight, except for BkE2; moderate for BkE2.	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Slight	Slight	Slight.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Moderate.
Moderate	Moderate for conifers; slight for hardwoods.	Slight, except for BrD2; moderate for BrD2.	Slight	Slight.
Moderate for BsD3; slight for all others.	Slight for conifers; slight for hardwoods.	Slight for BsB, BsC2, and BtB; moderate for BsD3 and BtD; severe for BtF.	Moderate for BtF; slight for all others.	Slight.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Moderate.
Slight	Moderate for conifers; slight for hardwoods	Slight	Slight	Slight.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Moderate.
Slight	Severe for conifers; moderate for hardwoods.	Slight for ChB2, ChC2, ChC3, and CnB; moderate for ChD2, ChE3, and CnD; severe for CnF.	Slight for ChB2, ChC2, ChC3, and CnB; moderate for ChD2, ChE3, and CnD; severe for CnF.	Slight.

TABLE 2.—*Soil interpretations*

Soils and map symbols	Quality of site for—		Suitable species—	
	Sugar maple, ash, and upland oak	Yellow poplar [1]	To favor in existing stands	For planting or seeding
Comly (CoA, CoB2)	Good	Good	Red oak, yellow-poplar, sugar maple, ash.	White pine, white spruce, yellow-poplar, larch.
Croton (CrA, CrB2)	Good for pin oak; poor for sugar maple, ash, and upland oak.		Pin oak	White pine, white spruce.
Duffield: (DfA, DfB2, DfC2, DfD2)	Excellent	Excellent	Red oak, black walnut, yellow-poplar, ash.	White pine, black walnut, larch, yellow-poplar, Norway spruce.
Duffield and Hagerstown: (DhC3, DhE3)	Very good	Very good	Red oak, yellow-poplar, ash.	White pine, yellow-poplar, larch, Norway spruce.
Edgemont: (EcB2, EcC2, EcD2)	Good	Good	Yellow-poplar, Virginia pine, red oak.	White pine, larch, Virginia pine, Norway spruce, yellow-poplar.
Edgemont and Dekalb: (EdB, EdD, EdF)	Fair		Red oak, black oak, white pine, Virginia pine.	White pine, Virginia pine.
Fogelsville (FoA, FoB2, FoC2)	Excellent	Excellent	Red oak, black walnut, yellow-poplar, ash.	White pine, larch, Norway spruce, black walnut, yellow-poplar
Glenville (GlA, GlB2)	Very good	Very good	Red oak, yellow-poplar, ash, white pine.	White pine, yellow-poplar, larch, Norway spruce.
Hagerstown (HaB2, HaC2)	Excellent	Excellent	Red oak, yellow-poplar, black walnut, ash.	White pine, yellow-poplar, black walnut, larch, Norway spruce.
Klinesville (KlB2, KlC2, KlD2, KlF2)	Fair		Virginia pine, chestnut oak, black oak.	Virginia pine, white pine.
Laidig (LaB2, LaC2, LdB, LdD)	Good	Good	Red oak, yellow-poplar, sugar maple.	White pine, yellow-poplar, larch, Norway spruce.
Lamington (Lg)	Excellent for pin oak; fair for sugar maple, ash, and upland oak		Pin oak, red maple, sycamore.	White pine, white spruce.
Lehigh (LhA, LhB2, LhC3)	Good		Red oak, Virginia pine, yellow-poplar.	Virginia pine, white pine, white spruce, larch.
Lewisberry (LrB2, LrC2, LrC3, LrD2, LrD3, LrE3, LsB, LsD, LsF).	Good	Good	Red oak, yellow-poplar, Virginia pine.	Virginia pine, white pine, yellow-poplar, larch, Norway spruce.
Lindside (Lt)	Excellent	Excellent	Red oak, yellow-poplar, black walnut, ash.	White pine, yellow-poplar, black walnut, larch, Norway spruce.
Litz (LzB2, LzC2, LzD2, LzE3)	Good		White oak, red oak, black oak, scarlet oak, Virginia pine, white pine.	Virginia pine, white pine, larch, Norway spruce.

See footnote at end of table.

for woodland—Continued

Management problems				
Seedling mortality	Plant competition	Equipment limitations	Erosion hazard	Windthrow hazard
Slight	Moderate for conifers; slight for hardwoods.	Moderate	Slight	Slight.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Moderate for DfD2; slight for DfA, DfB2, and DfC2.	Moderate for DfD2; slight for DfA, DfB2, and DfC2.	Slight.
Moderate	Severe for conifers; moderate for hardwoods.	Slight for DhC3; moderate for DhE3.	Moderate	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Moderate for EcD2; slight for EcB2 and EcC2.	Slight	Slight.
Moderate	Slight for conifers; slight for hardwoods.	Slight for EdB; moderate for EdD; severe for EdF.	Moderate for EdF; slight for EdB and EdD.	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Slight	Slight	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Moderate	Slight	Slight.
Slight	Severe for conifers; severe for hardwoods.	Moderate	Slight	Slight.
Severe	Slight for conifers; slight for hardwoods.	Slight for KlB2 and KlC2; moderate for KlD2; severe for KlF2.	Slight for KlB2, KlC2, and KlD2; moderate for KlF2.	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Moderate for LdD; slight for LaB2, LaC2, and LdB.	Slight	Slight.
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Moderate.
Slight	Severe for conifers; moderate for hardwoods.	Moderate	Moderate	Moderate.
Slight	Moderate for conifers; slight for hardwoods.	Slight for LrB2, LrC2, LrC3, and LsB; moderate for LrD2, LrD3, LrE3 and LsD; severe for LsF.	Moderate for LsF; slight for all others.	Slight.
Slight	Severe for conifers; severe for hardwoods.	Moderate	Slight	Slight.
Moderate	Moderate for conifers; slight for hardwoods.	Slight for LzB2, and LzC2; moderate for LzD2 and LzE3.	Slight	Slight.

TABLE 2.—*Soil interpretations*

Soils and map symbols	Quality of site for—		Suitable species—	
	Sugar maple, ash, and upland oak	Yellow poplar [1]	To favor in existing stands	For planting or seeding
Melvin (Ml)	Excellent for pin oak; fair for sugar maple, ash, and upland oak.	------------	Pin oak, red maple, sycamore.	White pine, white spruce.
Murrill (MrA3, MuA, MuB2, MuC2, MvB, MvC).	Good	Good	Red oak, black walnut, yellow-poplar.	White pine, yellow-poplar, larch, Norway spruce.
Neshaminy (NaC3, NaD3, NeB2, NeC2, NsD, NsF).	Very good	Very good	Red oak, yellow-poplar, black walnut, ash.	Yellow-poplar, black walnut, white pine, larch, Norway spruce.
Penn (PeB2, PeC2, PeD2)	Good	------------	Red oak, yellow-poplar, Virginia pine.	White pine, Virginia pine, larch, Norway spruce.
Philo (Ph, Pl)	Very good	Very good	Red oak, ash, yellow-poplar, black walnut, white pine.	Yellow-poplar, white pine, black walnut, larch, Norway spruce.
Pope (Po)	Excellent	Excellent	Red oak, yellow-poplar, black walnut, ash.	White pine, yellow-poplar, larch, black walnut, Norway spruce, Austrian pine.
Raritan (RaB)	Good	Good	Red oak, yellow-poplar, Virginia pine, black oak.	Yellow-poplar, white pine, Virginia pine, larch, Norway spruce.
Readington (ReA, ReB2)	Good	Good	Red oak, yellow- poplar, Virginia pine, ash.	Yellow-poplar, white pine, Virginia pine, larch, Norway spruce.
Reaville (RlA2, RlB2)	Fair	------------	Red oak, Virginia pine	Virginia pine, white pine
Rowland (Ro)	Very good	Very good	Red oak, yellow-poplar, ash.	White pine, yellow-poplar, larch, Norway spruce.
Ryder (RyA2, RyB2, RyC3)	Very good	Very good	Red oak, yellow-poplar, white pine, black walnut, ash.	White pine, larch, black walnut, yellow-poplar, Norway spruce.
Washington (WaA2, WaB2, WaC2)	Excellent	Excellent	Red oak, yellow-poplar, black walnut, ash.	Yellow-poplar, black walnut, white pine, larch, Norway spruce.
Watson (WcA)	Good	------------	Red oak, sugar maple, ash, hemlock, white pine.	White pine, larch, Norway spruce, white spruce.
Weikert and Berks (WeB2, WeC2, WeD2, WeF2).	Fair	------------	Virginia pine, black oak, chestnut oak.	Virginia pine, white pine.
Wiltshire (WsA), WsB2)	Very good	Very good	Red oak, yellow-poplar, ash, black walnut.	White pine, yellow-poplar, larch, Norway spruce.

[1] Dashes in this column indicate that the soils are not suited to yellow-poplar.

for woodland—Continued

Management problems				
Seedling mortality	Plant competition	Equipment limitations	Erosion hazard	Windthrow hazard
Severe	Severe for conifers; severe for hardwoods.	Severe	Slight	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Slight	Slight	Slight.
Moderate for NaC3 and NaD3; slight for all others.	Severe for conifers; severe for hardwoods.	Slight for NaC3, NeB2, and NeC2; moderate for NaD3 and NsD; severe for NsF.	Slight for NaC3, NeB2, and NeC2; moderate for NaD3 and NsD; severe for NsF.	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Slight for PeB2 and PeC2; moderate for PeD2.	Slight for PeB2 and PeC2; moderate for PeD2.	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Moderate	Slight	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Slight	Slight	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Moderate	Slight	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Moderate	Slight	Slight.
Moderate	Severe for conifers; moderate for hardwoods.	Moderate	Slight	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Moderate	Slight	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Slight	Slight	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Slight	Slight	Slight.
Slight	Moderate for conifers; slight for hardwoods.	Slight	Slight	Slight.
Severe	Slight for conifers; slight for hardwoods.	Slight for WeB2 and WeC2; moderate for WeD2; severe for WeF2.	Slight for WeB2, WeC2, and WeD2; moderate for WeF2.	Slight.
Slight	Severe for conifers; moderate for hardwoods.	Slight	Slight	Slight.

result from natural regeneration. A rating of *moderate* indicates that between 25 and 50 percent of the planted seedlings are likely to die; that some replanting is ordinarily needed; and that natural regeneration cannot always be relied upon for adequate and immediate restocking. A rating of *severe* indicates that more than 50 percent of the planted seedlings are likely to die; that considerable replanting, special preparation of the seedbed, and superior planting techniques are necessary for adequate and immediate restocking; and that restocking cannot be expected to result from natural regeneration.

PLANT COMPETITION.—This term refers to the rate at which brush, grass, and undesirable trees are likely to invade different kinds of soils. A rating of *slight* means that competition will not prevent adequate natural regeneration and early growth, and that it will not interfere with adequate development of the planted seedlings.

A rating of *moderate* means that competition from other plants will delay natural or artificial regeneration, the establishment of the plants, and the rate of growth, but that it will not prevent the natural development of a fully stocked, normal stand.

A rating of *severe* means that competition from other plants will prevent natural or artificial regeneration without intensive preparation of the site and maintenance treatments, such as weeding.

EQUIPMENT LIMITATIONS.—Ratings in this column show the degree of limitation, with reference to characteristics of the soils and topographic features, that restrict or prohibit the use of equipment for harvesting trees or planting seedlings. Steepness of slope, stoniness, and wetness are the principal limitations that restrict the use of equipment. A rating of *slight* indicates very few limitations. A rating of *moderate* means that the soil has some limitations, for example stones and boulders, moderately steep slopes, or wetness during some part of the year. A rating of *severe* indicates that prolonged wetness of the soil or steepness and stoniness severely limit the use of equipment. Where a rating of severe is given, track-type equipment is best for general use and winches or similar special equipment may be needed.

HAZARD OF EROSION.—The ratings for this hazard are based on the risk of erosion and indicate the amount or intensity of practices required to reduce or control erosion in these areas. Where the rating is *slight*, the risk of erosion is low when wood crops are harvested. Few, if any, practices are needed to control erosion. Where the rating is *moderate*, erosion control measures are needed on skid trails and logging roads immediately after a wood crop is harvested. Where the rating is *severe*, erosion, especially gullying, is a severe hazard where wood crops are harvested. Harvesting and other operations should be done across the slope wherever feasible. Skid trails and logging roads need to be laid out on as low a grade as feasible, and systems for disposing of excess water ought to be carefully maintained during logging operations. Practices that help to control erosion are needed on skid trails and logging roads immediately after logging is completed.

HAZARD OF WINDTHROW.—This hazard represents an evaluation of the factors that control the development of tree roots and, consequently, the likelihood that trees will be uprooted by wind. A rating of *slight* means that normally no trees are blown down by wind. A rating of *moderate* means that some trees will be expected to blow down during periods when the soils are excessively wet and when the velocity of the wind is high. A rating of *severe* means that many trees will be expected to blow down during periods when the soils are wet and the velocity of the wind is moderate to high.

Use of the Soils for Wildlife [4]

Many kinds of fish, small game, and songbirds are abundant throughout most of Berks County. The soils, topography, and pattern of land use are favorable for increasing the kinds and numbers of wildlife. The streams of the county provide good trout fishing and warm-water game fishing.

All land is capable of producing some kind of wildlife, and every kind of land is generally occupied by several game and nongame species. In planning land use, the soils that are most suitable for crops and that have the highest economic value are generally not used entirely for wildlife but are used for purposes that will bring the highest cash return. Soils that have severe limitations that make them unsuitable for cultivation are the ones used mainly for wildlife.

The kinds and the abundance of wildlife depend, to a large extent, upon the type of habitat available. An area is inhabited by the kinds of wildlife that have their habitat requirements met by the vegetation in the area. The vegetation, in turn, depends, to a great extent, upon the kinds of soils. If the natural conditions of the area are altered by drainage, cultivation, or other practices used in managing farmland or woodland, the kinds and patterns of vegetation change. Then, there may also be a change in the kinds and numbers of wildlife.

The soils of the county can be used for development of suitable wildlife habitat in woodlands, parks, hunting preserves, and wildlife refuges. In addition, the streams, lakes, and reservoirs have potential for greater use.

Kinds of wildlife

The following paragraphs describe the major kinds of wildlife in Berks County. Where reference is made to soil associations, the reader can find a description of the association in the front part of the soil survey. The location of each soil association is shown on the general soil map at the back of this survey.

Ring-necked pheasants are the most abundant small game species in the county. This county is among the top five counties in the State in total production of these birds. Marion Township is the leading pheasant-producing area, but Oley Valley and areas near Reading, Kutztown, and Lyons also have large populations of pheasants. In those areas the soils have formed in material that weathered from limestone or calcareous shale. Pheasants are most abundant in extensive areas of fertile farmland where corn and small grains are grown. They use areas of grassland for nesting, but the population of pheasants usually declines in farming areas that consist mainly of grassland.

Cottontail rabbits are the second most abundant small game species in the county. These animals are most abun-

[4] BY CLAYTON L. HEINEY and LEONARD F. BRYNIARSKI, wildlife biologists, Soil Conservation Service.

dant in areas of Penn and Lewisberry soils near Morgantown, where the small holdings and small timber-cutting operations are creating well-dispersed areas suitable for a habitat. Rabbits prefer the brushy areas that are interspersed with areas of cropland and grassland, and they are more numerous there than in large cultivated fields, large woodlots, and wooded areas. The habitat can be improved for rabbits by cutting back the vegetation along the borders of wooded areas. Also, planting grasses and legumes in the borders is beneficial to this game animal.

Gray squirrels are abundant throughout Blue Mountain on the Edgemont and Dekalb soils of association 1. They are also numerous in many small woodlots on the Chester and Brandywine soils of association 7, where mature oak and hickory trees are plentiful. Squirrels prefer areas of woodland that are interspersed with areas of cropland. They also generally prefer the edges of wooded tracts and openings in the woodland to large, unbroken tracts of forest.

Mourning doves thrive in areas where corn and small grains are grown. Such areas are association 3, consisting mainly of Berks, Weikert, and Bedington soils; association 4, consisting mainly of Ryder and Fogelsville soils; association 5, consisting mainly of Duffield and Washington soils; and association 7, consisting mainly of Chester, Glenville, and Brandywine soils. Doves are migratory birds. They prefer to nest and roost in trees that are in or at the edge of open areas. Frequently, they nest in a pine plantation. These birds travel a considerable distance from a roosting and nesting site to a feeding area.

Ruffed grouse are plentiful on the Edgemont and Dekalb soils of association 1, in the Blue Mountain area. A few of these birds also are scattered throughout the southern part of the county, where they frequent farm woodlots. Ruffed grouse prefer brushy stands of young trees and open areas. Their habitat requirements are much like those of white-tailed deer.

A few wild turkeys frequent forested areas of Blue Mountain. They are mainly on the Edgemont and Dekalb soils of association 1. Turkeys prefer mature forests that produce mast.

Limited numbers of bobwhite quail frequent the areas used for farming throughout the county, where small fields, planted to corn or to other grain crops adjoin meadows, brushy areas, and small woodlots. The number of bobwhite quail declines in large areas of open farmland that are clean farmed. The areas best suited to quail are association 7, which consists mainly of Chester, Glenville, and Brandywine soils, and association 9, which consists mainly of Lewisberry and Penn soils.

White-tailed deer are plentiful throughout the county. They are generally considered forest species, but they prefer areas where there is much brush or young trees, lesser amounts of mature trees, and open areas. The greatest concentration of deer is in the northern half of the county on the Edgemont and Dekalb soils of association 1; on the Laidig and Buchanan soils of association 2; on the Chester, Glenville, and Brandywine soils of association 7; and on the Lewisberry and Penn soils of association 9.

Muskrats are the principal fur-bearing animals in the county. They are found wherever small streams and farm ponds are near farming areas.

Waterfowl, mainly mallards, black ducks, wood ducks, and a few Canada geese, stop to rest and feed in this area during their migration to other parts of the country. Some stay and nest in the county. The major areas that provide nesting sites are Lake Ontelaunee, Hopewell Lake, and the Grace Mine Property at Morgantown.

Suitability of the soils for wildlife

In table 3 most of the soils of the county are rated according to their suitability for elements of wildlife habitat and for kinds of wildlife. The Made land and Rubble land mapping units are not included in the table, because they are not suited to use for wildlife or are too variable for rating. The categories rated in table 3 are described in the following paragraphs.

Grain and seed crops consist of domestic grains or of seed-producing, annual herbaceous plants that are planted to produce food for wildlife. Examples are corn, sorghum, wheat, millet, buckwheat, soybeans, and sunflower.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted to furnish food and cover for wildlife. Examples are fescue, bromegrass, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, and sericea lespedeza.

Wild herbaceous upland plants are native or introduced perennial grasses or forbs (weeds) that generally are established naturally and that provide food and cover, mainly for upland wildlife. Examples are ragweed, wheatgrass, wildrye, oatgrass, pokeweed, strawberry, beggarweed, goldenrod, and dandelion.

Hardwood woody plants are deciduous trees, shrubs, and woody vines that produce fruit, nuts, buds, catkins, twigs, or foliage used extensively as food for wildlife. These plants commonly are established naturally, but they also may be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, holly, maple, birch, and poplar. Smaller plants are grape, honeysuckle, blueberry, and greenbrier, raspberry, rose, and other briers.

Coniferous woody plants are trees and shrubs that bear cones or berrylike cones. They are important to wildlife, primarily as cover, but they also furnish food in the form of browse, seeds, or cones. These trees and shrubs are commonly established naturally, but they also may be planted. Examples are pine, spruce, white-cedar, hemlock, fir, redcedar, juniper, and yew.

Wetland food and cover plants are annual and perennial wild plants on moist to wet sites. These plants do not include submerged or floating aquatic plants that produce the food and cover used mainly by wetland wildlife. Examples of wetland food plants are smartweed, wild millet, bulrush, sedge, wild rice, switchgrass, reed canarygrass, and cattail.

Shallow water developments are areas of water that have been made by building low dikes or levees, by digging shallow excavations, or by using devices to control the water in marshy streams or channels. Depth of the water in these areas generally does not exceed 5 feet.

Excavated ponds are dug-out areas or combinations of dug-out areas and low dikes that hold water of suitable quality and depth, and in ample supply, for fish or wildlife. Such a pond should have a surface area of at least one-fourth of an acre and an average depth of 6 feet in at least one-fourth of the area. Also required is

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*

[Numerals in vertical columns have the following meanings: 1, well suited; 2, suited; 3, poorly suited; and 4, not suited. Ratings for the Made land mapping units (MaB, MaD, MdB, MdD, and MeB) and for Rubble land (Ru) are omitted because those miscellaneous land types are too variable to rate.]

Soils and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open land wildlife	Woodland wildlife	Wetland wildlife
Allenwood (AgB)	2	2	1	1	3	4	4	4	1	2	4
Andover (AnB)	4	3	2	2	2	3	4	4	3	2	4
Athol:											
(AsB2, AsC2)	2	1	1	1	3	4	4	4	1	1	4
(AsC3)	3	2	1	1	3	4	4	4	2	2	4
(AsD3)	4	3	1	1	3	4	4	4	3	2	4
(AtD)	4	3	2	2	2	4	4	4	3	2	4
Atkins (Au)	3	2	2	1	2	2	3	4	2	1	3
Baile:											
(Ba)	3	2	2	1	2	1	1	1	2	1	1
(Bd)	4	3	2	1	2	1	1	1	3	2	1
Bedington:											
(BeB2, BeC2)	2	1	1	1	3	4	4	4	1	2	4
(BeD2)	3	2	1	1	3	4	4	4	2	2	4
Berks:											
(BkA2, BkB2, BkC2)	2	2	2	2	2	4	4	4	2	2	4
(BkD2)	3	2	2	2	2	4	4	4	2	2	4
(BkE2)	4	3	2	2	2	4	4	4	3	2	4
Birdsboro (BlB, BmB)	2	1	1	1	3	4	4	4	1	1	4
Bowmansville (Bo)	3	2	2	1	2	2	3	4	2	1	3
Brandywine:											
(BrB2, BrC2)	2	2	2	2	2	4	4	4	2	2	4
(BrD2)	3	2	2	2	2	4	4	4	2	2	4
Brecknock:											
(BsB, BsC2)	2	2	2	2	2	4	4	4	2	2	4
(BsD3)	3	2	2	2	2	4	4	4	2	2	4
(BtB, BtD)	4	3	2	2	2	4	4	4	3	2	4
(BtF)	4	4	2	2	2	4	4	4	3	2	4
Brinkerton:											
(BuA)	3	3	2	2	2	1	1	1	3	2	1
(BuB2)	3	3	2	2	2	3	4	4	3	2	4
Buchanan:											
(BvB)	2	1	1	1	3	4	4	4	1	1	4
(BwB)	4	3	1	1	3	4	4	4	3	2	4
Burgin, gray surface variant (By)	4	3	3	1	1	1	1	1	3	1	1
Chester:											
(ChB2, ChC2)	2	1	1	1	3	4	4	4	1	1	4
(ChC3, ChD2)	3	2	1	1	3	4	4	4	2	2	4
(ChE3)	4	3	1	1	3	4	4	4	3	2	4
(CnB, CnD, CnF)	4	3	2	1	3	4	4	4	3	2	4
Comly:											
(CoA)	2	1	1	1	3	3	3	3	1	1	3
(CoB2)	2	1	1	1	3	4	4	4	1	1	4
Croton:											
(CrA)	3	2	2	2	2	1	1	1	2	2	1
(CrB2)	3	2	2	2	2	3	4	4	2	2	4

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soils and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Duffield:											
(DfA, DfB2, DfC2)	1	1	1	1	3	4	4	4	1	1	4
(DfD2, DhC3)	3	2	1	1	3	4	4	4	2	2	4
(DhE3)	4	3	1	1	3	4	4	4	3	2	4
Edgemont:											
(EcB2, EcC2)	2	1	1	1	3	4	4	4	1	1	4
(EcD2)	3	2	1	1	3	4	4	4	2	2	4
(EdB, EdD)	4	3	2	2	2	4	4	4	3	2	4
(EdF)	4	4	2	2	2	4	4	4	3	2	4
Fogelsville:											
(FoA)	1	1	1	1	3	4	4	4	1	1	4
(FoB2, FoC2)	2	1	1	1	3	4	4	4	1	1	4
Glenville:											
(GlA)	2	1	1	1	3	3	3	3	1	1	3
(GlB2)	2	1	1	1	3	4	4	4	1	1	4
Hagerstown (HaB2, HaC2)	2	1	1	1	3	4	4	4	1	1	4
Klinesville:											
(KlB2, KlC2)	3	3	2	2	2	4	4	4	3	2	4
(KlD2)	4	3	2	2	2	4	4	4	3	2	4
(KlF2)	4	4	2	2	2	4	4	4	3	3	4
Laidig:											
(LaB2, LaC2)	2	1	1	1	3	4	4	4	1	1	4
(LdB, LdD)	4	3	1	1	3	4	4	4	3	2	4
Lamington (Lg)	3	2	2	2	2	1	1	1	2	2	1
Lehigh:											
(LhA)	2	1	1	1	3	3	3	3	1	1	3
(LhB2)	2	1	1	1	2	4	4	4	1	1	4
(LhC3)	2	2	1	1	3	4	4	4	1	2	4
Lewisberry:											
(LrB2, LrC2, LrC3)	2	1	2	2	3	4	4	4	1	2	4
(LrD2, LrD3)	3	2	2	2	3	4	4	4	2	2	4
(LrE3)	4	3	2	2	3	4	4	4	3	2	4
(LsB, LsD)	4	3	1	1	3	4	4	4	3	2	4
(LsF)	4	4	1	1	3	4	4	4	3	2	4
Lindside (Lt)	2	1	1	1	3	3	3	3	1	1	3
Litz (LzB2, LzC2, LzD2, LzE3)	3	3	2	2	2	4	4	4	3	2	4
Melvin (Ml)	3	2	2	1	2	2	2	4	2	1	2
Murrill:											
(MrA3)	2	2	1	1	3	4	4	4	1	2	4
(MuA)	1	1	1	1	3	4	4	4	1	1	4
(MuB2, MuC2)	2	1	1	1	3	4	4	4	1	1	4
(MvB, MvC)	4	3	1	1	3	4	4	4	3	2	4
Neshaminy:											
(NaC3)	3	2	1	1	3	4	4	4	2	2	4
(NaD3)	4	3	1	1	3	4	4	4	3	2	4
(NeB2, NeC2)	2	1	1	1	3	4	4	4	1	1	4
(NsD)	4	3	1	1	3	4	4	4	3	2	4
(NsF)	4	4	1	1	3	4	4	4	3	2	4
Penn:											
(PeB2, PeC2)	2	2	2	2	2	4	4	4	2	2	4
(PeD2)	3	2	2	2	2	4	4	4	2	2	4

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TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soils and map symbols	Wildlife habitat elements								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open land wildlife	Woodland wildlife	Wetland wildlife
Philo:											
(Ph)	4	4	3	2	3	3	3	3	4	3	4
(Pl)	2	1	1	1	3	3	3	3	1	1	3
Pope (Po)	2	1	1	1	3	4	4	4	1	1	4
Raritan (RaB)	2	1	1	1	3	3	3	3	1	1	3
Readington:											
(ReA)	2	1	1	1	3	3	3	3	1	1	3
(ReB2)	2	1	1	1	3	4	4	4	1	1	4
Reaville (RlA2, RlB2)	2	2	2	2	3	3	3	3	2	3	3
Rowland (Ro)	2	1	1	1	3	3	3	3	1	1	3
Ryder (RyA2, RyB2, RyC3)	2	2	2	2	2	4	4	4	2	2	4
Washington:											
(WaA2)	1	1	1	1	3	4	4	4	1	1	4
(WaB2, WaC2)	2	1	1	1	3	4	4	4	1	1	4
Watson (WcA)	2	1	1	1	3	3	3	3	1	1	3
Weikert:											
(WeB2, WeC2)	3	3	2	2	2	4	4	4	3	2	4
(WeD2)	4	3	2	2	2	4	4	4	3	2	4
(WeF2)	4	4	2	2	2	4	4	4	3	2	4
Wiltshire:											
(WsA)	2	1	1	1	3	3	3	3	1	1	3
(WsB2)	2	1	1	1	3	4	4	4	1	1	4

a water table that is permanently high or another source of unpolluted water of low acidity.

Open land wildlife consists of birds and mammals commonly found in crop fields, in meadows and pastures, and in areas of nonforested, overgrown land. Among these birds and mammals are bobwhite quail, ring-necked pheasants, mourning doves, woodcocks, cottontail rabbits, meadowlarks, killdeer, and field sparrows.

Woodland wildlife consists of birds and mammals commonly found in wooded areas. Examples are ruffed grouse, wild turkeys, deer, squirrels, raccoons, wood thrushes, warblers, and vireos.

Wetland wildlife consists of birds and mammals commonly found in marshes and swamps. Examples are ducks, geese, herons, snipes, rails, coots, muskrats, mink, and beavers.

Use of the Soils for Engineering [5]

Soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, foundations for buildings, facilities for storage of water, erosion-control structures, drainage systems, and sewage disposal systems. The properties of importance to the engineer are permeability, shear strength, compaction characteristics, soil drainage, shrink-swell characteristics, particle size, plasticity, and acidity or alkalinity of the soils. Also important are depth to the water table, depth to bedrock, and topography.

The information in this soil survey can be used to—

1. Make studies of soil and land use that will aid in selecting and developing sites for industries, businesses, residences, and recreation.
2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make reconnaissance surveys of soil conditions that will aid in locating highways and airports and in planning detailed investigations of the intended locations.
4. Correlate the performance of pavements with types of soil and thus develop information that

[5] By DONALD MCCANDLESS and THEODORE IFFT, engineers, Soil Conservation Service.

will be useful in designing and maintaining the pavements.

5. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
6. Supplement information obtained from other published maps and reports and aerial photographs for the purpose of making soil maps and reports that can be used readily by engineers.
7. Estimate the suitability of sites for settling pools, silting basins, and other devices for disposing of industrial waste.
8. Estimate the properties of material removed when excavating for buildings and other structures.
9. Determine the suitability of soils for drainage and suitability as sites for the disposal of waste from septic tanks.

With the use of the soil map for identification of soils, the engineering interpretations in this subsection can be useful for many purposes. It should be emphasized, however, that they *do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depth of the layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.*

Some engineering information can be obtained from the soil map. Nevertheless, it will often be necessary to refer to other parts of the soil survey, especially to the sections "Descriptions of the Soils," "Use and Management of Soils," and "Formation and Classification of Soils."

Some of the terms used by soil scientists may be unfamiliar to the engineer, and other terms may have a special meaning in soil science. These and other special terms are defined in the Glossary in the back of this survey.

Much of the information in this subsection is in tables. Table 4 gives engineering test data obtained when the samples of selected soil series were tested. Table 5 gives estimates of the physical properties of the soils, and Table 6 provides engineering interpretations of these properties.

Engineering classification systems

Two systems of classifying soils are in general use among engineers. In table 5 the soils are classified according to both systems.

Most highway engineers classify soil material according to the system approved by the American Association of State Highway Officials (*1*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7, consisting of clay having low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. The group index number, when it is used, is placed in parentheses and follows the soil group symbol, for example, A–4(6).

Some engineers prefer to use the Unified soil classification system (*20*). In this system soil materials are identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class). An approximate visual classification of soils by this system can be made in the field. The Unified classification of the Berks County soils that were tested is given in the last column of table 4.

Soil test data

To be able to make the best use of the soil maps and soil survey, the engineer should know the physical properties of the soil material and the in-place condition of the soil. After testing the soil material and observing its behavior in engineering structures, the engineer can develop design recommendations for the mapping units delineated on the soil maps.

Table 4 gives engineering test data for samples of soils in some of the major series in Berks County. These samples were tested according to standard procedures to help evaluate the soils for engineering purposes. The engineering classifications given in table 4 and also in table 5 are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method should not be used in naming U.S. Department of Agriculture textural classes of soils.

The tests to determine liquid limit and plastic limit measure the effect of water on the consistence of soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from a semisolid to a plastic. As the moisture content is further increased, the material changes from a plastic to a liquid. The *plastic limit* is the moisture content at which the soil material passes from a semisolid to a plastic state. The *liquid limit* is the moisture content at which the material passes from a plastic to a liquid state. The *plasticity index* is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which soil material is in a plastic condition.

Table 4 also gives compaction (*moisture density*) data for the tested soils. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with the increase in moisture content. The highest dry density obtained in the compaction test is termed *maximum dry density.* Data that give moisture density are important in earthwork, for as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

Engineering properties and interpretations

For the soils in Berks County, table 5 gives estimated physical properties of typical soil profiles, which are divided into layers significant to engineering. Where test data are available, average values from table 4 are shown. Where tests were not performed, the estimates given are based on the results of testing similar soils in this county or in other counties and from past experience in engineering construction. Since the estimates are only for

TABLE 4.—

Soil series and location of soils	Parent material	Pennsylvania report No.	Depth	Moisture-density [2] Maximum dry density	Moisture-density [2] Optimum moisture
Athol:			*Inches*	*Lb. per cu. ft.*	*Pct.*
0.7 mile SW. of Yellow House and 473 feet E. of County Rd. 06188 (Modal profile).	Conglomerate of Triassic age.	BJ-22511	18–26	112	15
		BJ-22512	41–50	114	13
1.4 miles SE. of Yellow House along State Rt. 662 (Modal profile).	Conglomerate of Triassic age.	BJ-22513	16–24	112	16
		BJ-22514	32–50	113	15
300 feet S. of bridge over Manatawny Creek along County Rd. 06109, and 1 mile NE. of Amityville (Coarser textured than modal profile).	Conglomerate of Triassic age.	BJ-45882	13–29	115	14
		BJ-45883	41–74	118	13
0.7 mile SW. of Yellow House and 180 feet E. of County Rd. 06188 (Finer textured than modal profile).	Conglomerate of Triassic age.	BJ-45536	20–36	110	16
		BJ-45537	46–60	110	16
Bedington:					
0.4 mile S. of Krumsville along Rt. 06134 (Modal profile)	Arkosic sandstone and shale (Martinsburg formation).	BJ-33243	22–28	107	19
		BJ-33244	40–52	108	17
1,200 ft. W. from center of Lenhartsville and 50 ft. W. of U.S. 22 (Coarser textured than modal profile).	Arkosic sandstone and shale (Martinsburg formation).	BJ-45880	24–36	120	13
		BJ-45881	36–54	120	13
1.5 miles W. of Lenhartsville and 100 ft. S. of old U.S. 22 (Finer textured than modal profile).	Gray shale (Martinsburg formation).	BJ-45538	17–24	105	21
		BJ-45539	36–48	110	18
Berks:					
1 mile SW. of Rehrersburg on Rt. T672 (Modal profile).	Shale (Martinsburg formation).	BJ-22507	18–24	110	16
		BJ-22508	33–38	107	17
E. of New Schaefferstown and 105 feet S. of Rt. 83 near Rt. T951 (Modal profile).	Shale (Martinsburg formation).	BJ-22509	16–23	114	15
		BJ-22510	23–32	106	18
Glen Gery brickyard near Shoemakersville (Coarser textured than modal profile).	Shale (Martinsburg formation).	BJ-32426	14–23	114	15
		BJ-32427	23–36	114	14
S. side of U.S. 22, just W. of Rt. T566 (Finer textured than modal profile).	Shale (Martinsburg formation).	BJ-33241	9–23	104	18
		BJ-33242	30–41	94	23
Brinkerton:					
1 mile SE. of Bethel on E. side of Rt. T490 (Modal profile).	Shale and sandstone (Martinsburg formation).	BJ-33239	14–27	100	17
		BJ-33240	27–33	106	19
Glen Gery brick quarry SE. of Shoemakersville (Coarser textured than modal profile).	Shale and sandstone (Martinsburg formation).	BJ-32428	19–31	109	17
		BJ-32429	45–60	110	16
1 mile NE. of Rehrersburg and 50 feet W. of Rt. 06009 (Finer textured than modal profile).	Shale and sandstone (Martinsburg formation).	BJ-32430	15–24	108	19
		BJ-32431	30–36	112	16
Croton:					
0.5 mile N. of Chapel Hill Church near Geigertown and 82 feet S. of Rt. FAS-244 (Modal profile).	Red and gray material of Triassic age.	BJ-26757	24–30	111	17
		BJ-26758	34–46	121	11
0.7 mile WNW. of Scotts Run Lake near Hopewell Village (Coarser textured than modal profile).	Red shale and sandstone of Triassic age.	BJ-32415	20–28	119	13
		BJ-32416	33–40	126	9
Maplegrove motorcycle club near Plowville and 600 feet S. of Rt. 06082 (Finer textured than modal profile).	Sandstone, shale, and conglomerate (Brunswick formation).	BJ-32422	22–30	113	14
		BJ-32423	43–48	124	10

See footnotes at end of table.

Engineering test data [1]

Mechanical analysis [4]											Liquid limit	Plasticity index	Classification	
Discarded [3]	Percentage passing sieve [5]—					Percentage smaller than [5]—							AASHO [6]	Unified [7]
	3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
Pct.														
		100	95	89	79	66	63	47	28	20	31	7	A-4(6)	ML-CL
		100	94	83	55	35	33	27	18	11	34	3	A-2-4(0)	SM
		99	93	87	77	62	59	47	30	22	31	6	A-4(5)	ML
		100	92	85	72	52	49	37	24	16	29	4	A-4(3)	ML
		98	85	74	60	36	33	17	17	12	26	2	A-4(0)	SM
		100	93	81	64	38	36	25	15	10	22	[8] NP	A-4(1)	SM
			100	99	97	94	93	73	44	31	34	8	A-4(8)	ML
		100	97	93	87	79	77	62	39	30	33	10	A-4(8)	ML-CL
		75	63	59	50	32	31	28	22	18	35	9	A-2-4(0)	GM-GC
19		93	84	80	72	44	41	35	28	25	33	9	A-4(2)	SM-SC
		94	70	58	44	31	29	22	12	8	22	1	A-2-4(0)	SM
		86	73	65	57	41	25	23	16	13	21	1	A-1-b(0)	SM
		93	77	67	53	39	38	32	26	22	45	15	A-7-5(2)	SM
		92	58	45	30	20	19	16	13	11	43	13	A-2-7(0)	GM
		97	79	67	49	41	40	33	22	16	35	11	A-6(2)	SM-SC
		98	60	43	30	24	23	20	16	12	34	7	A-2-4(0)	GM
		92	81	68	46	26	24	20	15	11	29	7	A-2-4(0)	SM-SC
		74	44	35	26	17	16	13	9	8	33	6	A-1-b(0)	GM
		96	72	58	45	39	38	32	19	14	30	7	A-4(1)	SM-SC
	100	65	39	30	21	16	15	12	7	5	27	4	A-1-b(0)	GM-GC
		99	93	87	73	62	60	54	41	34	38	11	A 6(6)	ML
		99	91	82	64	51	50	43	29	27	47	16	A-7-5(6)	ML
		94	75	69	62	56	54	44	30	27	48	18	A-7-5(8)	ML
		91	75	69	60	50	47	38	26	21	43	13	A-7-5(4)	GM-SM
		100	80	63	53	50	49	40	27	20	35	7	A-4(3)	SM
		79	64	59	53	49	48	38	23	16	30	6	A-4(3)	GM-GC
			100	98	91	55	50	40	30	27	29	3	A-4(4)	ML-SM
			98	93	85	52	49	38	25	20	31	4	A-4(3)	ML-SM
				100	93	79	77	66	41	28	31	9	A-4(8)	ML-CL
		91	87	85	77	49	47	35	19	13	24	4	A-4(3)	SM-SC
		95	91	88	67	45	44	36	23	18	30	10	A-4(2)	SC
		89	80	75	54	31	30	23	13	10	21	3	A-2-4(0)	SM
				100	96	81	79	61	37	28	30	9	A-4(8)	ML-CL
		83	70	65	53	30	28	22	14	12	22	2	A-2-4(0)	SM

TABLE 4.—

Soil series and location of soils	Parent material	Pennsylvania report No.	Depth	Moisture-density [2]	
				Maximum dry density	Optimum moisture
			Inches	*Lb. per cu. ft.*	*Pct.*
Edgemont:					
0.75 mile SE. of the Fleetwood Borough line and 412 feet SW. of Rt. T729 (Modal profile).	Quartzite.	BJ–22515 BJ–22516	15–22 34–45	117 114	14 15
1.25 miles SE. of Breezy Corners on N. side of Rt. T569 (Modal profile).	Quartzite and sandstone (Tuscarora formation).	BJ–22517 BJ–22518	12–24 36–50	118 112	13 14
1.75 miles S. of Pricetown in a borrow pit along Rt. T569 (Coarser textured than modal profile).	Quartzite and sandstone.	BJ–32418 BJ–32419	25–42 70–110	117 123	13 11
0.75 mile SE. of Fleetwood in quarry on W. side of Rt. T729 (Coarser textured than modal profile).	Quartzite.	BJ–32424 BJ–32425	11–26 26–40	123 116	10 12
1.2 miles SE. of Pricetown in New Ringgold sand quarry, just off old Rt. 662 and S. of Rt. T901 (Finer textured than modal profile).	Quartzite and hard sandstone.	BJ 45534 BJ–45535	12–20 30	120 120	10 12
Lewisberry:					
2.75 miles E. of Scarlets Mill and 2.75 miles N. of Cold Run Station on the N. side of road 06096 (Modal profile).	Sandstone and quartz conglomerate of Triassic age.	BJ–22519 BJ–22520	26–33 39–50	125 126	11 10
2.25 miles E. of Scarlets Mill and 1.25 miles N. of Cold Run Station on the S. side of Rt. T347 (Modal profile).	Red quartz pebble conglomerate and sandstone of Triassic age.	BJ–26752 BJ–26753	16–24 36–55	129 121	10 12
1 mile NW. of Scarlets Mill and 30 feet E. of Rt. 06085 along Rt. 06087 (Coarser textured than modal profile).	Red quartz pebble conglomerate and sandstone of Triassic age.	BJ–32414 BJ 35831	23–33 53–62	117 118	12 12
Near the Scotts Run Lake entrance to French Creek State Forest, along a dirt road leading from Hopewell Village (Finer textured than modal profile).	Red sandstone and conglomerate of Triassic age.	BJ–35829 BJ -35830	20–31 36–56	118 121	13 11
Penn:					
1.2 miles SSW. of Weavertown and 225 feet E. of Rt. T468 (Modal profile).	Shale of Triassic age (Brunswick and Gettysburg formations).	BJ–26754 BJ–26755	11–17 17–22	112 114	16 16
0.5 mile NNE. of Baumstown (Coarser textured than modal profile).	Shale of Triassic age (Brunswick and Gettysburg formations).	BJ–35826 BJ–35827	5–12 12–16	111 115	15 13
1.2 miles SSW. of Weavertown and 55 feet E. of Rt. T468 (Finer textured than modal profile).	Shale of Triassic age (Brunswick and Gettysburg formations).	BJ–26756 BJ–35825	7–15 20–30	104 115	19 15
Raritan:					
0.7 mile SE. of Douglassville and 500 feet N. of Rt. 83 (Modal profile).	Alluvium (on terraces).	BJ–35832 BJ–35833	9–33 33–43	108 118	16 13
In Gibralter Playground on the N. side of Rt. 83 (Coarser textured than modal profile).	Alluvium (on terraces).	BJ–32420 BJ–32421	22–31 38–44	114 121	15 12
Percy Brown's Nursery, Robeson Township (Finer textured than modal profile).	Alluvium (on terraces).	BJ–32417 BJ–35836	10–25 39–48	111 120	16 12

See footnotes at end of table.

Engineering test data [1]—Continued

Mechanical analysis [4]											Liquid limit	Plasticity index	Classification	
Discarded [3]	Percentage passing sieve [5] —						Percentage smaller than [5]—						AASHO [6]	Unified [7]
	3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
Pct.														
24	------	87	80	75	62	39	37	32	25	18	24	3	A–4(1)	SM
27	------	------	99	94	67	48	46	42	30	21	31	6	A–4(3)	SM
--------	------	87	80	72	54	37	35	29	19	16	31	8	A–4(0)	SM–SC
--------	------	99	94	88	77	62	59	46	27	19	28	4	A–4(5)	ML–CL
--------	100	61	43	38	36	26	25	21	13	9	26	3	A 2 4(0)	GM
6	------	61	37	32	25	16	15	13	9	5	20	2	A–1–b(0)	GM
--------	100	61	51	47	43	19	18	16	11	8	18	2	A–1–b(0)	GM
10	100	68	51	45	40	7	7	6	4	3	NP	NP	A–1–b(0)	GP–GM
--------	------	85	74	71	50	10	8	6	6	5	NP	NP	A–1–b(0)	SP–SM
--------	------	90	74	70	41	6	4	3	2	1	NP	NP	A–1–b(0)	SP
--------	------	79	68	61	45	27	25	21	15	12	28	6	A–2–4(0)	SM–SC
11	------	97	90	84	64	36	33	26	20	15	24	5	A–4(0)	SM–SC
--------	------	81	66	57	39	24	23	21	12	9	24	3	A–1–b(0)	SM
--------	------	86	81	77	51	29	28	24	19	17	29	7	A–2–4(0)	SM–SC
--------	------	90	72	65	45	22	21	19	15	12	27	7	A–2–4(0)	SM–SC
--------	------	100	96	93	49	16	15	14	12	9	19	NP	A–1-b(0)	SM
--------	------	93	92	92	89	53	48	37	25	18	23	5	A–4(4)	ML–CL
5	------	100	97	96	87	28	26	20	15	10	17	NP	A–2–4(0)	SM
--------	100	86	67	57	49	45	44	35	20	13	28	5	A–4(2)	GM–GC
--------	------	89	67	54	46	41	40	32	17	12	26	1	A–4(1)	GM
--------	100	84	58	49	42	39	38	29	16	9	30	5	A–4(1)	GM–GC
--------	------	74	41	31	26	25	24	18	11	7	28	6	A–1–b(0)	GM–GC
--------	------	100	87	80	75	72	71	60	40	28	39	13	A–6(9)	ML–CL
--------	------	99	81	72	55	45	44	35	23	19	36	14	A–6(3)	SC–SM
--------	------	------	------	100	99	95	93	70	39	27	34	9	A–4(8)	ML–CL
--------	------	94	92	91	87	54	49	35	23	17	23	5	A–4(4)	ML–CL
--------	------	------	------	100	96	70	67	52	29	20	28	5	A–4(7)	ML–CL
--------	------	------	------	100	96	55	51	38	22	17	23	3	A–4(4)	ML
14	------	------	------	100	98	78	75	59	37	27	32	8	A–4(8)	ML–CL
--------	------	99	88	83	70	49	46	31	15	14	25	4	A–4(3)	SM–SC

TABLE 4.—

Soil series and location of soils	Parent material	Pennsylvania report No.	Depth	Moisture-density [2] Maximum dry density	Moisture-density [2] Optimum moisture
			Inches	*Lb. per cu. ft.*	*Pct.*
Readington:					
9 miles S. of Geigertown and 90 feet E. of Rt. 82, along Rt. 244 toward Joanna (Modal profile).	Shale and sandstone (Brunswick formation).	BJ–26759 BJ–35828	14–21 30 44	109 123	16 12
0.7 mile WNW. of Scotts Run Lake, near Hopewell Village, and 50 feet W. of Rt. T347 (Coarser textured than modal profile).	Shale and sandstone (Brunswick formation).	BJ–35834 BJ–35835	21–33 37–42	119 116	13 13
1.5 miles SW. of Weavertown on the W. side or Rt. 06059 (Finer textured than modal profile).	Shale and sandstone (Brunswick formation).	BJ–33245 BJ–33246	20–30 38–44	110 113	15 14
Ryder:					
1.5 miles NE. of Stouchsburg, 750 feet E. of Rt. 06025, and 700 feet N. of Rt. T498 (Modal profile).	Jacksonburg limestone (Hershey and Myerstown formations).	BJ–23420 BJ–23421	11–17 21–33	98 95	23 24
0.5 mile N. of Stouchsburg and 0.3 mile N. of Rt. 422 on E. side of Rt. T496 (Modal profile).	Jacksonburg limestone (Hershey and Myerstown formations).	BJ–23422 BJ–23423	8–13 21–33	98 90	22 27
Near Womelsdorf (Coarser textured than modal profile).	Limestone (Chambersburg formation).	BJ–45532 BJ–45533	9–14 23–30	101 102	19 19
Eastern Lime Company quarry, 0.9 mile N. of Limekiln along Rt. T539 (Finer textured than modal profile).	Limestone (Chambersburg formation).	BJ–45530 BJ–45531	18–28 32–38	112 112	16 17
Wiltshire:					
1½ miles SE. of Kutztown on E. side of Rt. T798 (Modal profile).	Limestone (Ordovician and Cambrian ages).	BJ–45886 BJ–45887	15–25 43	113 113	16 17
1 mile SW. of Pleasantville and 231 feet W. of Rt. 662 (Coarser textured than modal profile).	Limestone (Ordovician and Cambrian ages).	BJ–35837 BJ–35838	18-28 37–45	116 109	13 17
1.5 miles E. of Leesport and ENE. of Schuylkill Valley High School (Finer textured than modal profile).	Limestone (Ordovician and Cambrian ages).	BJ–45884 BJ–45885	17–31 42–48	104 112	18 15

[1] Tests performed by the Pennsylvania Department of Highways under a cooperative agreement with the U.S. Department of Commerce, Bureau of Public Roads, in accordance with standard procedures of the American Association of State Highway Officials (AASHO).

[2] Based on the AASHO designation T 99–57, "Moisture-Density Relations of Soils Using a 5.5-lb. Rammer and a 12-in. Drop," Method A (*1*).

[3] Particles larger than 3 inches were discarded in the laboratory.

[4] Mechanical analyses according to AASHO designation T 88–57 (*1*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 mm. in diam-

Engineering test data [1]—Continued

Mechanical analysis [4]											Liquid limit	Plasticity index	Classification	
Discarded [3]	Percentage passing sieve [5]—						Percentage smaller than [5]—						AASHO [6]	Unified [7]
	3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
Pct.														
--------	------	------	100	99	96	81	79	67	42	33	35	11	A-6(8)	ML-CL
--------	------	------	------	100	95	33	32	26	17	12	17	NP	A-2-4(0)	SM
--------	------	------		100	90	60	58	49	37	27	33	12	A-6(6)	CL
--------	------	------	99	99	92	74	70	54	38	33	30	11	A-6(8)	CL
--------	------	------	------	--------	100	97	94	75	46	35	32	11	A-6(8)	CL-ML
--------	------	100	88	82	75	65	63	50	33	26	34	12	A-6(7)	ML-CL
--------	------	------	------	100	96	90	88	73	45	31	42	8	A-5(8)	ML
--------	------	100	98	95	91	85	83	66	38	25	45	7	A-5(9)	ML
--------	------	98	96	94	91	87	86	74	44	29	40	7	A-4(8)	ML
--------	------	------	------	100	96	91	90	72	29	15	39	3	A-4(8)	ML
--------	------	99	87	81	73	65	62	51	33	24	35	3	A-4(6)	ML
--------	------	89	66	57	52	45	43	32	21	16	37	2	A-4(2)	GM
--------	------	100	86	77	59	45	43	36	27	20	37	6	A-4(2)	SM
--------	------	89	70	58	37	22	20	14	9	7	32	NP	A-1-b(0)	SM
--------	------	97	93	91	87	83	82	68	47	38	37	14	A-6(10)	ML-CL
--------	------	88	86	84	80	73	69	53	32	25	33	9	A-4(8)	ML-CL
--------	------	------	99	97	80	57	55	40	36	19	28	7	A-4(4)	ML-CL
--------	------	------	99	97	90	80	76	55	40	26	30	8	A-4(8)	ML-CL
--------	------	100	96	93	89	86	85	68	45	33	43	16	A-7-6(11)	ML-CL
--------	------	99	93	90	83	79	78	63	40	29	39	11	A-6(8)	ML

eter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 mm. in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

[5] Test data not corrected for material larger than 3 inches received in the laboratory.

[6] Based on AASHO designation M 145-49 (*1*).

[7] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1, Waterways Experiment Station, Corps of Engineers, March 1953 (*20*). Soil Conservation Service and Bureau of Public Roads have agreed to consider that all soils having plasticity indexes within 2 points from A-line are to be given a borderline classification. An example of a borderline classification is ML-CL.

[8] Nonplastic.

335-402—70——4

TABLE 5.—*Estimated soil*

[The Made land mapping units (MaB, MaD, MdB, MdD, and MeB) and Rubble land

Soil series and map symbol	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	USDA texture
	Ft.	*Ft.*	*In.*	
Allenwood (AgB)	3+	4 20	0–8	Gravelly silt loam
			8–32	Silt loam, silty clay loam
			32–48	Gravelly silt loam
Andover (AnB)	0–½	3½–7	0–5	Very stony loam
			5–23	Gravelly loam, gravelly clay loam
			23–53	Gravelly clay loam
Athol (AsB2, AsC2, AsC3, AsD3, AtD)	3+	3½–10	0–8	Silt loam
			8–24	Shaly silt loam, shaly clay loam
			24–50	Shaly loam
Atkins (Au)	0–½	4–6	0–11	Silt loam
			11–36	Silt loam
			36–42	Loam
Baile (Ba, Bd)	0–½	6–8	0–8	Silt loam
			8–40	Silty clay loam
			40–60	Clay loam
Bedington (BeB2, BeC2, BeD2)	3+	4–6	0–16	Shaly silt loam
			16–34	Shaly silty clay loam
			34–40	Shaly silty clay loam
Berks (BkA2, BkB2, BkC2, BkD2, BkE2)	3+	1½–3½	0–9	Shaly silt loam
			9–24	Shaly silt loam
			24–38	Very shaly silt loam
Birdsboro (BlB, BmB)	3+	3½–20	0–11	Silt loam
(For properties of the Duffield soils in BmB, refer to the Duffield series.)			11–46	Silt loam
Bowmansville (Bo)	0–½	4–8	0–17	Silt loam
			17–42	Silt loam
			42–50	Fine sandy loam
Brandywine (BrB2, BrC2, BrD2)	3+	1½–3½	0–7	Channery loam
	3+		7–30	Sandy loam, gravelly loam
Brecknock (BsB, BsC2, BsD3, BtB, BtD, BtF)	3+	3½–6	0–15	Channery silt loam
			15–38	Channery silt loam
			38–48	Very channery silt loam
Brinkerton (BuA, BuB2)	0–½	3½–5	0–14	Silt loam
			14–31	Silty clay loam
			31–38	Shaly clay loam
Buchanan (BvB, BwB)	1½–3	4–30	0–8	Gravelly loam
			8–26	Silt loam, clay loam
			26–60	Clay loam
Burgin, gray surface variant (By)	0–½	3½–10	0–15	Silt loam, silty clay loam
			15–42	Silty clay, silty clay loam
Chester (ChB2, ChC2, ChC3, ChD2, ChE3, CnB, CnD, CnF)	3+	4–10	0–8	Channery silt loam
			8–44	Silt loam, loam

properties significant to engineering

(Ru) are omitted from this table because their properties are too variable to be estimated]

Percentage passing sieve—			Engineering classification		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Unified	AASHO						
					In. per hr.	*In. per in. of soil depth*	*pH*	*Pct.*	*Lb. per cu. ft.*	
					2.0-6.3	0.10-0.15	5.5-6.0			
60-75	55-65	25-35	GC, SC	A-2	2.0-6.3	0.10-0.15	5.0-5.5	8-12	120-130	Low.
60-75	55-60	25-40	GC-GM, SM	A-2, A-6	2.0-6.3	0.06-0.10	4.5-5.5	8-12	120-130	Low.
					0.2-6.3	0.14-0.20	4.5-5.5			
90-100	90-100	65-95	CL, ML	A-4, A-6	0.20-0.63	0.08-0.14	4.5-5.0	14-18	100-112	Moderate.
70-85	60-80	40-55	SC, CL, GM, SM	A-4, A-6	<0.2	0.08-0.12	4.5-5.5	12-18	110-120	Moderate.
					0.63-2.0	0.16-0.22	6.0-7.0			
90-100	75-95	50-70	ML, CL	A-4	0.63-2.0	0.12-0.16	6.0-7.0	14-16	110-115	Moderate.
90-100	80-95	35-60	ML, SM	A-4	0.63-6.3	0.10-0.14	5.0-6.0	13-16	110-118	Moderate.
					0.63-2.0	0.16-0.20	6.0-7.0			
95-100	95-100	55-80	ML, CL	A-4, A-6	0.63-2.0	0.10-0.14	5.2-7.0	15-18	105-110	Moderate.
90-100	90-100	60-90	ML, CL	A-4, A-6	0.63-2.0	0.06-0.10	5.1-6.0	15-18	105-110	Moderate.
					0.20-0.63	0.16-0.20	6.0-7.0			
95-100	90-100	65-75	CL, ML	A-4, A-6	<0.20	0.12-0.16	5.5-6.5	18-21	105-110	Moderate.
85-95	80-90	60-75	CL, ML	A-4, A-6	<0.20	0.10-0.14	5.0-6.0	14-16	105-110	Moderate.
					0.63-2.0	0.12-0.16	4.5-5.0			
60-80	55-70	30-40	SM, SC	A-2, A-4	0.63-2.0	0.11-0.14	4.0-4.5	13-19	105-117	Low.
55-85	45-80	20-45	SM, GM	A-2, A-4	0.63-6.3	0.05-0.10	4.0-4.5	13-18	108-120	Low.
					2.0-6.3	0.06-0.12	6.0-7.0			
75-90	60-80	25-50	SM, SC	A-2, A-6	2.0-6.3	0.04-0.06	6.5-7.0	15-18	104-114	Low.
40-80	30-60	15-35	SM, SC	A-2	2.0-6.3	0.02-0.05	6.5-7.0	14-23	94-114	Low.
					2.0-6.3	0.16-0.20	5.0-6.0			
90-100	90-100	55-80	ML, CL	A-4	0.63-2.0	0.12-0.16	5.5-6.5	14-16	110-115	Low.
					0.63-2.0	0.16-0.20	5.5-6.0			
95-100	95-100	85-100	ML, CL	A-4, A-6	0.63-2.0	0.16-0.18	4.5-5.5	12-18	100-110	Moderate.
85-100	80-100	30-80	ML, SM	A-2, A-4	2.0-6.3	0.06-0.10	4.5-5.0	8-12	110-115	Low.
					0.63-2.0	0.08-0.12	5.1-6.0			
65-80	55-70	25-45	SM	A-2, A-4	0.63-2.0	0.05-0.08	5.0-6.0	16-18	115-120	Low.
					0.63-2.0	0.12-0.18	5.5-6.5			
65-80	65-80	40-75	ML, GC	A-6	0.63-2.0	0.06-0.10	5.0-6.0	16-18	110-115	Moderate.
75-95	70-90	35-65	SM, ML	A-6	0.63-2.0	0.03-0.06	5.0-6.0	15-17	100-110	Low.
					0.2-6.3	0.22-0.25	5.5-6.5			
75-100	60-100	50-60	ML, CL	A-4, A-7	0.2-0.63	0.12-0.18	5.0-6.5	17-19	100-109	Moderate.
60-100	60-95	45-55	ML, GM	A-4, A-6	<0.2	0.06-0.10	4.5-6.5	16-19	106-112	Moderate.
					0.63-2.0	0.15-0.18	5.0-6.5			
85-90	75-90	50-65	ML, CL	A-6	0.63-2.0	0.08-0.14	4.5-5.5	14-16	110-115	Low.
75-90	70-85	45-55	ML, CL, SM	A-6	<0.2	0.06-0.10	4.5-5.0	12-14	114-120	Low.
					0.2-0.63	0.12-0.16	6.5-7.5			Moderate.
90-100	90-100	90-100	ML, CL	A-6, A-7	<0.2	0.08-0.12	6.5-7.5	16-20	105-110	Moderate.
					0.63-2.0	0.12-0.16	6.5-7.0			
85-90	80-90	55-70	ML, CL	A-4, A-5	0.63-2.0	0.10-0.14	6.5-7.0	17-19	105-110	Low.

TABLE 5.—*Estimated soil properties*

Soil series and map symbol	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	USDA texture
	Ft.	*Ft.*	*In.*	
Comly (CoA, CoB2)	1½–3	3½–8	0–9	Shaly silt loam
			9–27	Shaly silt loam
			27–41	Shaly silt loam
Croton (CrA, CrB2)	0–½	3½–6	0–8	Silt loam
			8–30	Silt loam, silty clay loam
			30–40	Silt loam
Dekalb (Mapped only in undifferentiated units with Edgemont soils.)	3+	2–3½	0–12	Stony sandy loam
			12–30	Channery sandy loam
			30–50	Very stony sandy loam
Duffield (DfA, DfB2, DfC2, DfD2, DhC3, DhE3) (For properties of the Hagerstown soils in DhC3 and DhE3, refer to the Hagerstown series.)	3+	3½–8	0–8	Silt loam
			8–52	Silt loam, silty clay loam
Edgemont (EcB2, EcC2, EcD2, EdB, EdD, EdF) (For properties of the Dekalb soils in EdB, EdD, and EdF, refer to the Dekalb series.)	3+	3½–7	0–8	Sandy loam
			8–36	Loam, sandy loam
			36–50	Sandy loam
Fogelsville (FoA, FoB2, FoC2)	3+	4–6	0–11	Silt loam
			11–38	Silt loam
			38–56	Shale fragments
Glenville (GlA, GlB2)	1½–3	3½–8	0–8	Silt loam
			8–27	Silt loam
			27–60	Loam
Hagerstown (HaB2, HaC2)	3+	3½–6	0–14	Silt loam
			14–40	Silty clay loam, silty clay
			40–53	Silty clay loam
Klinesville (KlB2, KlC2, KlD2, KlF2)	3+	1–1½	0–8	Shaly silt loam
			8–19	Very shaly silt loam
Laidig (LaB2, LaC2, LdB, LdD)	3+	4–20	0–13	Gravelly loam, stony loam
			13–38	Gravelly clay loam
			38–55	Gravelly loam
Lamington (Lg)	0–½	4–20	0–8	Silt loam
			8–32	Clay loam
			32–48	Silt loam
Lehigh (LhA, LhB2, LhC3)	1½–3	3½–6	0–14	Silt loam
			14–41	Channery silt loam
			41–50	Channery clay loam
Lewisberry (LrB2, LrC2, LrC3, LrD2, LrD3, LrE3, LsB, LsD LsF).	3+	3½–10	0–10	Gravelly sandy loam
			10–30	Gravelly sandy loam
			30–50	Gravelly sandy clay loam
Lindside (Lt)	1½–3	3½–6	0–8	Silt loam
			8–33	Silt loam

significant to engineering—Continued

Percentage passing sieve—			Engineering classification		Permea-bility	Available moisture capacity	Reaction	Optimum moisture for com-paction	Maximum dry density	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Unified	AASHO						
					In. per hr.	*In. per in. of soil depth*	*pH*	*Pct.*	*Lb. per cu. ft.*	
					0.63–2.0	0.10–0.14	5.0–5.5			
80–95	65–85	55–65	ML, CL	A-4	0.63–2.0	0.06–0.10	5.0–5.5	13–15	110–115	Low.
80–90	65–80	45–55	ML, SM	A-4	<0.2	0.04–0.08	4.5–5.0	12–14	114–118	Low.
					0.63–2.0	0.19–0.26	6.0–7.0			
90–100	85–100	45–80	ML, SM	A-4	<0.2	0.14–0.18	5.5–6.0	13–17	111–119	Moderate.
70–90	65–85	30–50	SM, SC	A-2, A-4	<0.2	0.10–0.14	5.0–5.5	9–11	121–126	Moderate.
					2.0–6.3	0.06–0.10	4.5–5.0			
60–80	60–75	25–35	GM, SM	A-2	2.0–6.3	0.06–0.10	4.5–5.0	10–15	115–120	Low.
60–70	50–65	25–35	GM, SM	A-2	2.0–6.3	0.03–0.06	4.5–5.0	9–13	110–115	Low.
					2.0–6.3	0.16–0.22	6.0–7.0			
95–100	95–100	85–90	CL	A-7	0.63–2.0	0.14–0.20	6.5–7.0	15–20	105–110	Moderate.
					2.0–6.3	0.08–0.12	4.5–5.5			
40–80	40–75	15–40	SM, GM	A-2, A-4	2.0–6.3	0.06–0.10	4.5–5.0	10–14	117–123	Low.
40–95	35–90	15–45	SM, GM	A-2, A-4	2.0–6.3	0.06–0.10	4.5–5.0	11–15	112–123	Low.
					0.63–2.0	0.16–0.20	6.0–7.0			
100	95–100	70–85	ML	A-4	0.63–2.0	0.12–0.16	5.5–7.0	18–22	100–105	Moderate.
30–55	20–55	20–50	GM	A-2, A-4	0.63–2.0	0.06–0.10	6.0–7.0	15–20	105–110	Moderate.
					0.63–2.0	0.18–0.20	6.0–6.5			
90–100	85–95	75–90	ML, CL	A-4	0.20–0.63	0.12–0.16	5.5–6.5	16–18	105–110	Low.
75–90	75–85	45–75	ML, CL, SC	A-4	0.63–2.0	0.10–0.14	5.0–5.5	14–16	110–115	Low.
					2.0–6.3	0.16–0.20	7.0–7.5			
95–100	95–100	75–100	CL, CH	A-6, A-7	0.63–2.0	0.08–0.14	7.0–7.5	16–20	100–105	Moderate.
85–100	80–100	70–90	CL, CH	A-4, A-7	0.63–2.0	0.08–0.12	7.0–7.5	15–20	100–105	Moderate.
					2.0–6.3	0.08–0.12	5.0–5.5			
30–50	25–50	10–35	GM, GC	A-2	2.0–6.3	0.02–0.06	5.5–6.0	11–14	115–120	Low.
					0.63–2.0	0.08–0.12	5.5–6.5			
70–80	60–70	50–60	ML	A-4	0.63–2.0	0.06–0.10	5.0–6.5	12–15	115–120	Low.
65–75	50–65	35–55	ML, GM	A-4	0.20–0.63	0.06–0.10	4.5–5.8	10–14	120–125	Low.
					0.20–0.63	0.16–0.20	6.0–6.5			
95–100	95–100	80–95	ML, CL	A-4, A-6	<0.2	0.08–0.12	5.0–6.0	10–14	110–115	Moderate.
90–100	90–100	75–90	ML, CL	A-4, A-6	<0.2	0.08–0.12	4.5–5.5	10–12	120–125	Low.
					0.63–2.0	0.16–0.20	6.0–6.5			
65–80	65–75	40–60	ML, GM	A-4	0.63–2.0	0.14–0.16	6.0–6.5	12–15	110–115	Low.
45–65	30–45	20–35	ML, GC	A-2	0.2–0.63	0.06–0.10	5.5–6.0	15–18	105–110	Low.
					2.0–0.63	0.10–0.14	4.0–4.5			
70–90	55–90	20–55	ML, SM	A-2, A-4	2.0–6.3	0.06–0.10	4.5–5.0	10–13	115–125	Low.
85–100	75–95	15–35	ML, SM	A-2	2.0–6.3	0.03–0.06	4.5–5.5	10–12	120–125	Low.
					0.63–2.0	0.21–0.26	6.5–7.5			
90–100	80–100	60–100	ML, CL	A-4, A-6	0.63–2.0	0.21–0.26	6.8–7.5	12–15	110–115	Moderate.

TABLE 5.—*Estimated soil properties*

Soil series and map symbol	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	USDA texture
	Ft.	*Ft.*	*In.*	
Litz (LzB2, LzC2, LzD2, LzE3)	3+	1½–2½	0–8	Shaly silt loam
			8–22	Very shaly silt loam
Melvin (Ml)	0–½	3½–6	0–8	Silt loam
			8–42	Silt loam, silty clay loam
Murrill (MrA3, MuA, MuB2, MuC2, MvB, MvC)	3+	5–30	0–8	Gravelly loam
			8–36	Silt loam, silty clay loam
			36–60	Silt loam, gravelly silt loam
Neshaminy (NaC3, NaD3, NeB2, NeC2, NsD, NsF)	3+	4–6	0–12	Silt loam
			12–52	Silty clay loam
Penn (PeB2, PeC2, PeD2)	3+	2–3½	0–12	Shaly silt loam
			12–24	Shaly silt loam
			24–28	Very shaly loam
Philo (Ph, Pl)	1½–3	3½–10	0–40	Silt loam
Pope (Po)	3+	3½–10	0–30	Silt loam, loam, fine sandy loam
			30–55	Fine sand
Raritan (RaB)	1½–3	3½–20	0–9	Silt loam
			9–43	Silt loam
			43–46	Sandy loam
Readington (ReA, ReB2)	1½–3	3½–6	0–14	Silt loam
			14–44	Loam, clay loam, silty clay loam
			44–66	Shaly loam
Reaville (RlA2, RlB2)	1–3	1½–3	0–12	Silt loam
			12–26	Shaly silty clay loam
Rowland (Ro)	1½–3	3½–7	0–10	Silt loam
			10–42	Loam
Ryder (RyA2, RyB2, RyC3)	3+	2–3½	0–7	Silt loam
			7–17	Silt loam, silty clay loam
			17–33	Silt loam
Washington (WaA2, WaB2, WaC2)	3+	4–10	0–8	Silt loam
			8–42	Silty clay loam
			42–57	Silt loam
Watson (WcA)	1½–3	4–40	0–9	Silt loam
			9–42	Clay loam, silty clay loam
			42–57	Clay loam
Weikert (WeB2, WeC2, WeD2, WeF2) (For properties of the Berks soils in these mapping units, refer to the Berks series.)	3+	1–1½	0–8	Shaly silt loam
			8–19	Very shaly silt loam
Wiltshire (WsA, WsB2)	1½–3	3½–8	0–20	Silt loam
			20–41	Silty clay loam
			41–60	Silt loam

significant to engineering—Continued

Percentage passing sieve—			Engineering classification		Permea-bility	Available moisture capacity	Reaction	Optimum moisture for com-paction	Maximum dry density	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Unified	AASHO						
					In. per hr.	*In. per in. of soil depth*	*pH*	*Pct.*	*Lb. per cu. ft.*	
					2.0–6.3	0.06–0.10	5.5–6.0			
90–100	80–95	75–85	ML, CL	A–4, A–6	2.0–6.3	0.05–0.10	5.5–6.0	16–18	115–120	Moderate.
					0.63–2.0	0.14–0.18	6.5–7.5			
90–100	90–100	90–100	ML, CL	A–6, A–7	0.20–0.63	0.14–0.18	6.5–7.5	10–15	115–120	Low.
					2.0–6.3	0.10–0.14	5.5–7.0			
80–100	75–95	55–80	ML, CL	A–6	0.63–6.3	0.10 0.14	5.0–6.0	15–20	105–110	Moderate.
70–90	65–75	55–60	ML, CL	A–6	0.63–6.3	0.06–0.10	5.0–6.0	15–20	110–115	Moderate.
					0.63–2.0	0.14–0.18	5.5–6.0			
85–100	80–95	65–85	MH, ML	A–7	0.63–2.0	0.10–0.14	5.0–5.5	15–19	105–110	Low.
					2.0–6.3	0.19–0.22	5.5–6.0			
55–90	45–80	35–75	ML, GM	A–4	2.0–6.3	0.12–0.16	5.0–5.5	15–19	105–110	Moderate.
40–85	30–75	30–55	ML, GM	A–4	2.0–6.3	0.02–0.06	5.0–5.5	13–16	110–115	Low.
75–90	75–85	55–70	ML, CL	A–4	0.63–2.0	0.10–0.14	5.0–6.0	10–14	110–115	Moderate.
65–90	60–80	40–65	ML, GM	A–2, A–4	0.63–2.0	0.10–0.14	6.5–7.0	10–14	110–115	Low.
50–75	45–60	20–45	GM, SM	A–2, A–4	2.0–6.3	0.08–0.10	6.4–7.0	8–10	115–120	Low.
					0.63–2.0	0.18–0.20	6.0–6.5			
75–95	75–95	50–65	ML, CL	A–4	<0.20	0.10–0.14	6.0–6.5	15–16	115–120	Low.
50–70	35–50	20–35	GM, GC	A–2	0.63–2.0	0.06–0.10	5.5–6.5	8–10	120–125	Low.
					0.63–2.0	0.17–0.20	5.5–6.5			
95–100	95–100	60–100	ML, CL	A–6	<0.20	0.12–0.16	5.5–6.5	13–16	110–120	Moderate.
70–90	60–75	40–55	ML, SM, GM	A–4, A–6	0.63–2.0	0.06–0.10	5.5–6.5	12–14	113–123	Moderate.
					0.63–2.0	0.14–0.18	5.5–6.0			
70–100	65–100	60–90	CL	A–6	<0.20	0.06–0.08	5.5–6.0	10–15	105–110	Moderate.
					0.63–2.0	0.10–0.14	5.5–6.5			
65–90	65–85	55–70	ML	A–4	0.63–2.0	0.06–0.10	5.0–5.5	12–14	110–115	Moderate.
					2.0–6.3	0.18–0.22	6.0–7.0			
85–100	75–100	45–90	ML, SM	A–4, A–5	0.63–2.0	0.14–0.18	6.5–7.0	16–22	95–100	Low.
65–100	55–100	30–90	ML, SM	A–4, A–5	0.63–2.0	0.06–0.10	5.5–6.5	17–27	90–100	Low.
					0.63–2.0	0.14–0.18	6.5–7.0			
80–100	75–95	55–80	ML, CL	A–4	0.63–2.0	0.10–0.12	6.5–7.0	16–18	105–110	Low.
85–100	80–95	55–65	ML	A–4, A–6	0.63–6.3	0.10–0.12	5.6–6.0	18–20	105–110	Low.
					0.63–2.0	0.12–0.16	6.7–7.0			
90–100	90–100	75–90	ML, CL	A–4	<0.20	0.08–0.12	5.5–6.5	10–15	115–120	Low.
90–100	85–95	60–75	ML, CL	A–4, A–6	0.20–0.63	0.08–0.12	5.0–5.5	14–16	110–115	Low.
40–60	30–45	20–30	GM, GC	A–1, A–2	2.0–6.3	0.06–0.12	5.5–6.2	15–18	110–115	Low.
30–40	25–40	10–25	GM, GW, GC	A–1, A–2	2.0–6.3	0.02–0.06	5.0–6.0	10–15	115–120	Low.
					0.63–2.0	0.16–0.20	6.5–7.0			
90–100	90–100	75–85	ML, CL	A–4, A–6	0.20–0.63	0.12–0.16	6.5–7.0	13–18	105–115	Moderate.
85–100	85–95	70–80	ML, CL	A–4, A–6	<0.20	0.08–0.12	6.5–7.0	10–15	105–115	Moderate.

TABLE 6.—*Interpretations of*

[The Made land mapping units (MaB, MaD, MdB, MdD and MeB) are omitted

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—		
			Topsoil	Sand and gravel	Road fill
Allenwood (AgB)	Good	Low	Fair	Unsuitable	Good
Andover (AnB)	Poor	High	Poor	Unsuitable	Poor
Athol (AsB2, AsC2, AsC3, AsD3, AtD)	Good	Moderate	Good	Unsuitable	Fair
Atkins (Au)	Fair	Moderate	Fair	Unsuitable	Poor
Baile (Ba, Bd)	Poor	High	Poor	Unsuitable	Poor
Bedington (BeB2, BeC2, BeD2)	Good	Moderate	Good	Unsuitable	Fair
Berks (BkA2, BkB2, BkC2, BkD2, BkE2)	Fair	Moderate	Fair	Unsuitable	Fair
Birdsboro (BlB, BmB) (For interpretations for the Duffield soil in BmB, refer to the Duffield series.)	Good	Low	Good	Fair	Good
Bowmansville (Bo)	Poor	High	Fair	Unsuitable	Fair
Brandywine (BrB2, BrC2, BrD2)	Fair	Moderate	Fair	Unsuitable	Fair
Brecknock (BsB, BsC2, BsD3, BtB, BtD, BtF)	Fair	Moderate	Fair	Unsuitable	Fair
Brinkerton (BuA, BuB2)	Poor	High	Poor	Unsuitable	Poor
Buchanan (BvB, BwB)	Poor	Moderate	Fair	Unsuitable	Fair

engineering properties of soils

from this table, because their properties are too variable to be estimated]

Soil features affecting engineering practices for—						
Highway location	Construction and maintenance of pipelines	Impoundments: Reservoir area	Impoundments: Embankment	Agriculture drainage	Irrigation	Terraces, diversions, and waterways
No undesirable features.	No undesirable features.	No undesirable features.	No undesirable features.	Well drained.	No undesirable features.	No undesirable features.
High water table; frost heaving.	High water table; stoniness.	Surface stoniness.	Surface stoniness.	Slowly permeable fragipan; stoniness.	High water table; slow permeability.	High water table; stoniness.
Limestone ledges are common.	Limestone ledges are common.	Limestone ledges.	No undesirable features.	Well drained.	High available moisture capacity.	Limestone ledges.
High water table; instability; flooding.	Flooding; high water table.	Flooding; in places contains some lenses of gravel.	Instability; flooding.	Flooding; high water table.	Flooding; high water table.	Flooding; high water table.
High water table; frost heaving.	High water table.	No undesirable features.	Unstable where content of mica is high.	Stoniness in places; slow permeability; high water table.	High water table; slow permeability.	Stoniness in places; high water table.
No undesirable features.	No undesirable features.	Rapid permeability where shale is exposed.	Rapid permeability; content of coarse fragments is high.	Well drained.	No undesirable features.	No undesirable features.
1½ to 3 feet to shale bedrock.	1½ to 3 feet to bedrock.	1½ to 3 feet to bedrock; in most places permeability is moderately rapid.	Rapid permeability where content of coarse fragments is high.	Well drained.	Low available moisture capacity.	1½ to 3 feet to bedrock.
No undesirable features.	No undesirable features.	Few lenses of gravel in substratum.	No undesirable features.	Well drained.	No undesirable features.	No undesirable features.
High water table; flooding; instability.	Flooding; high water table.	Flooding; pervious layers in underlying material.	Stable if placement is done selectively.	Flooding; high water table.	Flooding; high water table.	Flooding; high water table.
1½ to 3 feet to bedrock or saprolite.	1½ to 3 feet to bedrock; some hard ledges.	1½ to 3 feet to bedrock or saprolite; rapid permeability.	Pervious substratum.	Well drained.	Low to moderate available moisture capacity.	1½ to 3 feet to bedrock.
Restricted depth to bedrock; stoniness in places.	Restricted depth to bedrock; stoniness in places.	Restricted depth to bedrock.	Channery and stony in places.	Well drained.	Restricted depth to bedrock.	Restricted depth to bedrock; stoniness in places.
High water table; frost heaving.	High water table.	No undesirable features.	Instability.	Slow permeability; high water table.	Slow permeability; high water table.	High water table.
Seasonal high water table; stoniness in places.	Seasonal high water table; boulders in places.	Stoniness in places.	Instability; stoniness in places.	Slowly permeable fragipan at a depth of 2 to 3 feet.	Seasonal high water table; slow permeability.	Stoniness in places; seepage on top of the fragipan.

TABLE 6.—*Interpretations of*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill
Burgin (By)	Poor	High	Fair	Unsuitable	Poor
Chester (ChB2, ChC2, ChC3, ChD2, ChE3, CnB, CnD, CnF).	Good	Moderate	Good	Unsuitable	Fair
Comly (CoA, CoB2)	Poor	Moderate	Fair	Unsuitable	Fair
Croton (CrA, CrB2)	Unsuitable	High	Fair	Unsuitable	Poor
Dekalb	Good	Low	Poor	Poor	Good
Duffield (DfA, DfB2, DfC2, DfD2, DhC3, DhE3) (For interpretations for the Hagerstown soils in DhC3 and DhE3, refer to the Hagerstown series.)	Poor	Moderate	Good	Unsuitable	Fair
Edgemont (EcB2, EcC2, EcD2, EdB, EdD, EdF) (For interpretations for the Dekalb soils in EdB, EdD, and EdF, refer to the Dekalb series.)	Good	Low	Fair	Unsuitable	Good
Fogelsville (FoA, FoB2, FoC2)	Fair	Moderate	Fair	Unsuitable	Fair
Glenville (GlA, GlB2)	Poor	Moderate	Fair	Unsuitable	Fair
Hagerstown (HaB2, HaC2)	Poor	Moderate	Good	Unsuitable	Fair
Klinesville (KlB2, KlC2, KlD2, KlF2)	Good	Low	Poor	Unsuitable	Fair
Laidig (LaB2, LaC2, LdB, LdD)	Fair	Low	Fair	Unsuitable	Good
Lamington (Lg)	Poor	High	Poor	Unsuitable	Poor

engineering properties of soils—Continued

Soil features affecting engineering practices for—							
Highway location	Construction and maintenance of pipelines	Impoundments: Reservoir area	Impoundments: Embankment	Agriculture drainage	Irrigation	Terraces, diversions, and waterways
High water table; instability.	High water table	No undesirable features.	Instability	Slow permeability; high water table.	Slow permeability; high water table.	High water table.
Stoniness in places.	Stoniness in places	Rapid permeability in the substratum.	Difficult to compact in places.	Well drained	No undesirable features.	Stoniness in places.
Seasonal high water table; seepage on top of the fragipan.	Seasonal high water table.	No undesirable features.	Unstable	Slow permeability in the fragipan; seasonal high water table.	Seasonal high water table; slow permeability.	Seepage on top of the fragipan.
High water table	High water table	No undesirable features.	Unstable	High water table; slow permeability.	High water table; slow permeability.	High water table.
2 to 3½ feet to bedrock.	2 to 3½ feet to bedrock.	2 to 3½ feet to bedrock; moderately rapid permeability.	Pervious material.	Well drained	Moderate to low available moisture capacity.	2 to 3½ feet to bedrock.
A few rock outcrops; solution chambers.	A few rock outcrops; solution chambers.	Sinkholes and solution channels; moderately rapid permeability.	No undesirable features.	Well drained	No undesirable features.	Rock ledges.
Stoniness in places.	Hard rock within 3 to 7 feet of the surface.	Moderately rapid permeability.	Moderately rapid permeability.	Well drained	Moderately rapid permeability; medium to low available moisture capacity.	No undesirable features.
No unfavorable features.	No unfavorable features.	No undesirable features.	Fair stability	Well drained	No undesirable features.	No undesirable features.
Seasonal high water table.	Seasonal high water table.	Pervious substratum.	Difficult to compact; subject to piping.	Moderately slow permeability; seasonal high water table.	Moderately slow permeability; seasonal high water table.	Seasonal high water table; seepage on top of the fragipan.
Limestone ledges	Limestone ledges	Sinkholes; channels; permeable substratum.	Fair stability	Well drained	No undesirable features.	Limestone ledges.
Shallow to shale bedrock.	Shallow to shale bedrock.	Moderately rapid permeability; shallow over shale bedrock.	Moderately rapid permeability.	Well drained	Moderately rapid permeability; low available water capacity.	Shallow over shale bedrock.
Stoniness in places.	Stoniness in places.	No undesirable features.	Fair stability; boulders in places.	Well drained	No undesirable features.	Stoniness in places.
High water table	High water table; slow permeability.	No undesirable features.	Poor stability	High water table; slow permeability.	Seasonal high water table; slow permeability.	No undesirable features.

TABLE 6.—*Interpretations of*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill
Lehigh (LhA, LhB2, LhC3)	Fair	Moderate	Poor	Unsuitable	Good
Lewisberry (LrB2, LrC2, LrC3, LrD2, LrD3, LrE3, LsB, LsD, LsF).	Good	Low	Poor	Fair	Good
Lindside (Lt)	Poor	Moderate	Good	Unsuitable	Fair
Litz (LzB2, LzC2, LzD2, LzE3)	Fair	Moderate	Fair	Unsuitable	Fair
Melvin (Ml)	Unsuitable	High	Good	Unsuitable	Poor
Murrill (MrA3, MuA, MuB2, MuC2, MvB, MvC)	Fair	Moderate	Fair	Unsuitable	Good
Neshaminy (NaC3, NaD3, NeB2, NeC2, NsD, NsF)	Good	Moderate	Good	Unsuitable	Fair
Penn (PeB2, PeC2, PeD2)	Fair	Moderate	Fair	Unsuitable	Fair
Philo (Ph, Pl)	Poor	High	Fair	Unsuitable	Fair
Pope (Po)	Fair	Moderate	Good	Poor	Fair
Raritan (RaB)	Poor	Moderate	Fair	Unsuitable	Fair
Readington (ReA, ReB2)	Poor	Moderate	Fair	Unsuitable	Fair

engineering properties of soils—Continued

Soil features affecting engineering practices for—						
Highway location	Construction and maintenance of pipelines	Impoundments		Agriculture drainage	Irrigation	Terraces, diversions, and waterways
		Reservoir area	Embankment			
Seasonal high water table.	Seasonal high water table; 3½ to 6 feet to bedrock.	3½ to 6 feet to bedrock.	High proportion of coarse fragments cause permeable fill.	Moderately slow permeability; high water table.	Moderately slow permeability; high water table.	Moderately slow permeability.
Stoniness in places.	Stoniness in places.	Rapid permeability in the substratum.	Stoniness	Well drained	No undesirable features.	No undesirable features.
Seasonal high water table.	Flooding; seasonal high water table.	Possibility of lenses of gravel in substratum.	Flooding; fair stability.	Flooding; high water table.	Flooding; high water table.	Flooding; high water table.
Moderately deep over shaly bedrock.	Moderately deep to shaly bedrock.	Moderately rapid permeability; moderately deep over bedrock.	Difficult to compact if high in content of coarse fragments.	Well drained	Moderate to low available moisture capacity.	1½ to 2½ feet to shaly bedrock.
Flooding; high water table.	High water table; instability.	Flooding; possibility of lenses of gravel.	Instability	Flooding; moderately slow permeability; high water table.	Moderate to high available moisture capacity; high water table.	High water table; flooding.
Solution chambers in places.	Solution chambers in places.	Permeable substratum; solution chambers in places.	Fair stability	Well drained	No undesirable features.	Stoniness in places.
Stoniness in places; very hard bedrock below a depth of 4 feet.	Boulders in places; very hard bedrock below a depth of 4 feet.	Stoniness; pervious substratum.	Unstable material and large stones in places.	Well drained	No undesirable features.	Stoniness in places.
2 to 3½ feet to shale bedrock.	2 to 3½ feet to bedrock.	Contains some permeable material; 2 to 3½ feet to bedrock.	Some material is permeable.	Well drained	Moderate to low available moisture capacity.	2 to 3½ feet to bedrock.
Seasonal high water table; instability; flooding.	Flooding; seasonal high water table.	Lenses of permeable gravel in substratum.	High water table.	Flooding; high water table.	High water	Flooding; high water table.
Flooding	Flooding	Lenses of permeable gravel in places.	No undesirable features.	Well drained	No undesirable features.	Flooding.
Seasonal high water table; infrequent flooding.	Seasonal high water table.	No undesirable features.	No undesirable features.	Fragipan at a depth of 1½ to 2½ feet.	Seasonal high water table; moderately slow permeability.	No undesirable features.
Seasonal high water table; seepage on top of the fragipan.	Seasonal high water table.	No undesirable features.	Slow permeability; fairly stable.	Slow permeability; fragipan at a depth of 1½ to 2½ feet.	Slow permeability; fragipan at a depth of 1½ to 2½ feet.	High water table; seepage on top of the fragipan.

TABLE 6.—*Interpretations of*

Soil series and map symbol	Suitability for winter grading	Susceptibility to frost action	Suitability as source of— Topsoil	Sand and gravel	Road fill
Reaville (RIA2, RIB2)	Unsuitable	High	Fair	Poor	Poor
Rowland (Ro)	Poor	High	Fair	Unsuitable	Fair
Rubble land (Ru)	Poor	Low	Unsuitable	Poor	Poor
Ryder (RyA2, RyB2, RyC3)	Poor	Moderate	Good	Unsuitable	Poor
Washington (WaA2, WaB2, WaC2)	Good	Moderate	Good	Unsuitable	Fair
Watson (WcA)	Unsuitable	High	Fair	Poor	Poor
Weikert (WeB2, WeC2, WeD2, WeF2) (For interpretations for the Berks soils in these mapping units, refer to the Berks series.)	Good	Low	Poor	Unsuitable	Fair
Wiltshire (WsA, WsB2)	Unsuitable	High	Fair	Unsuitable	Poor

a typical profile, considerable variation from these values should be anticipated. More information about the range of properties of the soils can be obtained from other parts of the soil survey.

Table 5 lists the names of the soil series in alphabetic order and gives the map symbols of each soil. It also shows depth to a seasonal high water table and to bedrock. Depth to a seasonal high water table is important to the engineer because soils that have a high water table are limited in their use for highways and for other structures. Depth to bedrock is also important because it may greatly affect the cost of excavating and the design of foundations.

In the column headed "Depth from Surface," the depth, in inches, is given for the major distinctive layers of the soil profile. This profile is the one described as typical for each series in the section "Descriptions of the Soils," and the layers indicated are those typical of the layers in all the soils of the series. The estimates in the succeeding columns are approximate average values given for the layer specified. Estimates of some properties are omitted for the surface layer, because the material from that layer is generally unsuitable for use in many engineering structures. This material is commonly used as a topdressing to promote the growth of plants on the shoulders and slopes along roads or in other areas.

The column titled "Permeability" gives figures to show the rate of movement of water through the soil material in an undisturbed soil. Permeability depends largely on the texture, porosity, and structure of the soil. A permeability rate of less than 0.2 inch per hour indicates *slow* movement of water through the soil; of 0.2 to 0.63 inch, *moderately slow;* of 0.63 to 2.0, *moderate;* and of 2.0 to 6.3, *moderately rapid.* A permeability rate greater than 6.3 is *very rapid.* In table 5 a rating of <0.20 is shown for soils that have slow permeability.

The estimates of available moisture capacity, in inches per inch of soil depth, show the amount of water the soil can hold available for plants between field capacity and the wilting point, that is, the amount of water the soil

engineering properties of soils—Continued

Soil features affecting engineering practices for—						
Highway location	Construction and maintenance of pipelines	Impoundments: Reservoir area	Impoundments: Embankment	Agriculture drainage	Irrigation	Terraces, diversions, and waterways
Moderately deep to soft shale; seasonal high water table.	Moderately deep to soft shale; seasonal high water table.	Moderately deep to soft shale.	Material is permeable in places where content of coarse fragments is high.	Moderately deep to soft shale.	Low available moisture capacity.	No undesirable features.
Seasonal high water table; instability; flooding.	Seasonal high water table; flooding.	Flooding; pervious layers in substratum.	No undesirable features.	Flooding; seasonal high water table.	High water table; flooding; fragipan.	Flooding.
Boulders and exposed bedrock.	Boulders and exposed bedrock.	Boulders and exposed bedrock.	Boulders	Boulders	Boulders	Boulders.
Unstable when wet; 2 to 3 feet to bedrock.	Some limestone ledges.	2 to 3 feet to bedrock.	Instability	Well drained	No undesirable features.	2 to 3 feet to bedrock.
A few rock outcrops; solution chambers; sinkholes.	A few rock ledges; sinkholes.	Solution chambers; sinkholes; ledges.	Unstable; permeable.	Well drained	No undesirable features.	No undesirable features.
High water table	High water table	No undesirable features.	No undesirable features.	Slow permeability.	Slow permeability.	Seepage above fragipan.
1 to 1½ feet to shale.	1 to 1½ feet to shale.	1 to 1½ feet to bedrock.	Permeable where content of shale is high.	Well drained	Very low available moisture capacity.	1 to 1½ feet to bedrock.
Seasonal high water table; unstable.	Seasonal high water table; some limestone ledges.	Few limestone ledges; sinkholes can open up.	Unstable	Slow permeability.	Slow permeability.	No undesirable features.

can hold available for plants before permanent wilting occurs. The retention of water by the soil is related to the texture, structure, and bulk density of the soils and to their content of organic matter.

The column that shows reaction gives the degree of acidity or alkalinity of the soils. In this system of notations, pH 7.0 is neutral; lower values indicate acidity, and higher values indicate alkalinity. The pH of soils that have been cropped for a long time and that have received a large amount of lime over a period of years may be higher than the ranges shown in this table.

Shrink-swell potential indicates the change in volume to be expected in soil material as the content of moisture changes. It is estimated primarily on the basis of the amount and type of clay in the soil. In general, soils classified as CH and A–7 have a moderate to high shrink-swell potential. Clean sand and gravel, and those soils that contain only a small amount of nonplastic or slightly plastic fines, as well as most other nonplastic or slightly plastic soil materials, have low shrink-swell potential.

Table 6 rates the soils of the county according to their suitability for winter grading, susceptibility to frost action, and suitability as a source of topsoil, sand and gravel, and road fill. It also names the soil features that adversely affect engineering practices and structures and that therefore must be considered in planning practices and in designing, constructing, and maintaining structures. The interpretations are based on the results of research and on the judgment of engineers and soil scientists who have had experience with the soils in Berks and other counties.

The ratings for suitability for winter grading and for susceptibility to frost action are based on such factors as texture of the soils, depth to a seasonal high water table, and climatic conditions that are common in this county in winter. Where road subgrade is mentioned in table 6, reference is made to material immediately below base course. Information in the column titled "Suitability as source of road fill" pertains to material in the remainder of the fill.

Suitability of the soils as a source of borrow material for topsoil, sand and gravel, and road fill depends partly on the height of the water table and on the drainage of the soils. Poorly drained and very poorly drained soils occur on the floors of valleys and also in the uplands. Some of these poorly drained or very poorly drained soils contain too much organic matter to be suitable for use in road fills. They should be removed and replaced with suitable material. Roadways constructed in areas that are frequently flooded ought to be built on embankments so that the surface of the pavement is well above the level of the water table.

If a highway cut is planned at a location where the water table is high, a survey should be made to determine the needs for interceptor drains and underdrains. Seepage along the back slopes of a cut can cause slumping or sliding of the underlying material. If the water table is high enough that it is near the under side of the pavement, lenses of ice can form in the subgrade, and differential volume changes may cause breaking of the pavement. A high water table or a prolonged wet period makes earthwork difficult in soils that are only moderately well drained to poorly drained. Therefore, in areas of wet soils July and August generally are the most favorable months to work on highways.

Features that affect the construction and maintenance of pipelines include depth to bedrock, depth to a seasonal high water table, and flooding. Other important soil features are acidity, a high content of organic matter, and the presence of sulfate and chloride salts.

The column headed "Impoundments" is divided into two parts, titled "Reservoir area" and "Embankment," respectively. In these columns features that affect suitability of the soils for impoundments are named. A soil feature can have an adverse affect if the soil is used for a reservoir area but can still be suitable for an embankment or vice versa. The information in these columns can also be applied if these soils are to be used as a site for a dike, a levee, a lagoon, or a sedimentation pool.

The features named as ones that affect agricultural drainage include both those that affect surface drainage and those that affect subsurface drainage. The main features considered were slow permeability, a high water table, and seepage.

The information given in the column headed "Irrigation" refers only to sprinkler irrigation. Among the features named are soil depth, moisture-holding capacity of the soils, permeability, and stoniness.

Table 6 also names the main features that affect the construction and maintenance of terraces, diversions, and waterways. These features are mainly shallowness over bedrock, presence of boulders and cobbles, seepage, flooding, and a high water table.

Use of the Soil Survey in Community Development

This soil survey will help in planning community developments and in solving problems that arise as use of the land changes. Planning officials and developers, as well as homeowners and others, can find useful information in the soil maps, in the text, and in the tables in this survey. The detailed maps in the back of the survey are useful because they show the location of each of the soils in the county and are published at a scale that is generally considered suitable for community planning. Interpretive maps can be made from the information in tables 5 and 6 to assist in determining limitations of specific areas. The maps and these tables will serve only as a guide, however, and do not take the place of direct, detailed investigation at the site of a proposed development.

Table 7 in this subsection lists all the soils in the county and shows the kinds and estimated degree of limitation that affect use of the soils for various purposes. The ratings given are based only on the characteristics of the soils. They do not take into consideration such factors as location in relation to an established business center or to a transportation line, which often decide the ultimate use of an area. The ease or difficulty of making improvements for a given purpose is largely controlled by the characteristics of the soils.

Soil features that are related to use of soils for community developments are depth to bedrock, degree of slope, permeability, incidence of flooding, depth to a seasonal high water table, texture of the soils, and stoniness. In table 7 ratings of *slight*, *moderate*, and *severe* have been used to describe the degrees of limitation. A rating of *slight* indicates that the degree of limitation can be none to slight, but few soils have no limitation to use. A rating of *moderate* indicates soil limitations that require special practices to overcome. A rating of *severe* indicates soil limitations that generally are very difficult to overcome. The uses for community development or recreation that are rated in table 7 are discussed in the following paragraphs.

Onsite disposal of sewage effluent.—The main limiting features of the soils for drainage fields for septic tanks are restricted permeability, steepness of slope, shallowness over bedrock, and the presence of a seasonal high water table. In addition, where soils are underlain by cavernous limestone, the underground water can be contaminated by seepage through crevices in the rocks or through solution channels. Soils that have a rating of slight generally have few or no limitations that affect their use as disposal fields for sewage effluent. Those that have a rating of moderate may be borderline and should be investigated carefully at the exact site where a disposal field is to be installed. For some soils that have a rating of moderate, a larger drainage field is needed than where soils have a rating of slight. For all the soils that have a rating of severe, especially careful investigation is needed at the site of the proposed disposal field to see if the field can be expected to function properly. Limitations for disposal fields that are used only a short time each year for summer camps or similar uses may be less severe than indicated in table 7.

Sewage lagoons.—The limitations to use of the soils for sewage lagoons are about the same as those shown in table 6 in the subsection "Use of the Soils for Engineering," under the column headed "Impoundments." Among the features that control the degree of limitation for sewage lagoons are a hazard of flooding, the amount of seepage, permeability of the substratum, depth to bedrock, and the degree of slope.

Locations of homes and other buildings.—Table 7 rates the soils for suitability as homesites and as locations of service buildings in recreational areas. The ratings are for buildings that are three stories or less in height and that require less than an 8-foot excavation for a basement. Considered in rating the soils are depth to a seasonal high water table, depth to and kind of bedrock, degree of slope, hazard of flooding, and the need for land shaping and other kinds of landscaping. Also, flooding is a severe hazard in some areas. Depth to bedrock or to a high water table is a less severe limitation for buildings that do not have a basement than for those that have a basement.

Landscaping and lawns at homesites.—Among the important soil properties that determine whether an area is suitable for landscaping and whether a good lawn can be established are the depth, texture, slope, and droughtiness of the soils; depth to the water table; and the presence of stones or rocks. The needs for lime and fertilizer are not considered, because it is assumed that enough lime and fertilizer have been applied so that plants will grow. Enough suitable soil material is needed so that desirable trees and other plants can survive and grow well.

Streets and parking lots for subdivisions.—The soil requirements for streets and parking lots are similar to those for highways. Factors that are considered are depth to and kind of bedrock, depth to the water table, and texture of the soils, and these are shown in table 5 for each of the soils. Table 6 indicates the suitability of each soil in the county for road fill, the features that affect location of highways, and susceptibility to frost action. Flooding and steepness of slope are among the limiting features that affect suitability of soils for streets and parking lots. Soils that have slopes of more than 8 percent are severely limited for use for those purposes.

Athletic fields.—Areas used for football, baseball, tennis, volleyball, and other sports are fairly small. Because these areas must be nearly level, considerable shaping may be necessary. Features limiting use of an area for an athletic field are slope, depth to and kind of bedrock, a high water table, stoniness, and flooding or local ponding. Also, a soil that has a clayey or gravelly surface layer is generally not well suited to use for an athletic field.

Parks and extensively used play areas.—Within this county are fairly large areas that, if left in their natural state, are suitable for hiking, picnicking, and other kinds of recreation. Trails, picnic sites, and other small areas can be cleared and kept in sod. The main features that restrict use of soils for parks and play areas are strong slopes, flooding, a high water table, soil texture, and the presence of rocks or stones. Some areas that are steep or stony, however, can be used as a scenic spot or for nature trails.

Sanitary land fill.—This is an area that is used for the disposal of refuse or garbage by covering with soil material to a depth that meets the requirements of sanitation and stabilizes the fill. Obtaining enough soil material to cover the refuse and garbage is the main requirement. Among features that limit use for land fill are shallowness to bedrock, flooding, a high water table, and presence of stones or rock. Where trenches are to be dug, depth to underlying bedrock is especially important. Sinkholes in areas underlain by limestone should not be used for disposing of refuse, because seepage from the refuse can enter solution channels and contaminate the underground water. Esthetic, economic, and sociological factors were not considered in the ratings shown in table 7 for sanitary land fill, though they are important in establishing such an area.

Cemeteries.—The requirements for a site for a cemetery are adequate depth of unconsolidated material that is easily excavated, absence of a seasonal water table to a depth of 6 feet, and a site high enough that it will not be flooded. Medium-textured soils that are free of stones are preferred so that the area can be landscaped and lawns established and maintained with a minimum of maintenance work.

Descriptions of the Soils

This section describes the soil series and mapping units of Berks County. The acreage and proportionate extent of each mapping unit are given in table 8. Their location in the county is shown on the soil map at the back of this soil survey.

The procedure is first to describe the soil series, and then the mapping units in that series. Thus, to get full information on any mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which it belongs. As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Rubble land, for example, is a miscellaneous land type that does not belong to a soil series. It is listed, nevertheless, in alphabetic order along with the soil series.

In comparing a mapping unit with a soil series, many will prefer to read the short description in paragraph form. It precedes the technical description that identifies layers by A, B, and C horizons and depth ranges. The technical profile descriptions are mainly for soil scientists and others who want detailed information about soils.

Following the name of each mapping unit, there is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit in which the mapping unit has been placed. The page on which each capability unit is described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

In the detailed description of the soil profile, the color of each horizon is described in words, such as yellowish brown, but it is also indicated by symbols for the hue, value, and chroma, for example 10YR 5/4. These symbols, called Munsell color notations, are used by soil scientists to evaluate the color of the soil precisely. For the profile described, the names of the colors and the color symbols are for a moist soil unless stated otherwise.

Most of the soils of Berks County are more than 3 feet deep over bedrock. The soils on flood plains and those in colluvial material are built upon by the slow addition of alluvial or colluvial material on the surface, and they are the deepest soils in the county. Many of the soils are moderately deep, that is, they are 20 to 36 inches deep over bedrock. Many of these soils, however, have

TABLE 7.—*Estimated degree and kinds of*

[The Made land mapping units (MaB, MaD, MdB, MdD, and MeB) are not included

Soil series and map symbol	Onsite disposal of sewage effluent	Sewage lagoons	Locations of homes and other buildings of three stories or less	Landscaping and lawns at homesites
Allenwood (AgB)	Slight	Severe: moderately rapid permeability.	Slight	Slight
Andover (AnB)	Severe: high water table.	Moderate: slope	Severe: high water table.	Severe: high water table.
Athol:				
(AsB2)	Slight	Moderate: moderate permeability.	Slight	Slight
(AsC2)	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope
(AsC3)	Moderate: slope	Severe: slope	Moderate: slope	Severe: severe erosion.
(AsD3)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(AtD)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Atkins (Au)	Severe: flooding; high water table.	Severe: flooding	Severe: flooding; high water table.	Severe: flooding; high water table.
Baile (Ba, Bd)	Severe: high water table.	Slight	Severe: high water table.	Severe: high water table.
Bedington:				
(BeB2)	Slight	Severe: moderately rapid permeability.	Slight	Slight
(BeC2)	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope
(BeD2)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Berks:				
(BkA2, BkB2)	Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.
(BkC2)	Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock; slope.	Moderate: 1½ to 3 feet to bedrock; slope.	Moderate: 1½ to 3 feet to bedrock; slope.
(BkD2)	Severe: 1½ to 3 feet to bedrock; slope.	Severe: slope	Severe: slope	Severe: slope
(BkE2)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Birdsboro:				
(BlB)	Slight	Moderate: slope; moderate permeability.	Slight	Slight
Birdsboro-Duffield:				
(BmB)	Slight	Moderate: [1] slope; moderate permeability.	Slight	Slight
Bowmansville (Bo)	Severe: flooding; high water table.	Severe: flooding	Severe: flooding; high water table.	Severe: high water water table.
Brandywine:				
(BrB2)	Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.
(BrC2)	Severe: 1½ to 3 feet to bedrock.	Severe: slope	Severe: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.
(BrD2)	Severe: 1½ to 3 feet to bedrock; slope.	Severe: slope	Severe: 1½ to 3 feet to bedrock.	Severe: slope
Brecknock:				
(BsB)	Moderate: 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock.	Slight
(BsC2)	Moderate: 3½ to 6 feet to bedrock; slope.	Severe: slope	Moderate: 3½ to 6 feet to bedrock.	Moderate: slope
(BsD3)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(BtB)	Moderate: 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock; slope.	Moderate: 3½ to 6 feet to bedrock.	Moderate: stoniness.
(BtD)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(BtF)	Severe: slope	Severe: slope	Severe: slope	Severe: slope

See footnote at end of table.

limitations for community developments

in this table, because their properties are too variable for estimates to be made]

Streets and parking lots for subdivisions	Athletic fields	Parks and extensively used play areas	Sanitary land fill	Cemeteries
Moderate: slope	Moderate: slope	Slight	Slight	Slight.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: slope	Moderate: slope	Slight	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope; severe erosion.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness.
Severe: flooding; high water table.	Severe: high water table.	Severe: high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: slope	Moderate: slope	Slight	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.	Slight	Moderate: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.
Severe: slope	Severe: slope	Moderate: slope	Moderate: 1½ to 3 feet to bedrock; slope.	Moderate: 1½ to 3 feet to bedrock; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight	Slight [1]	Slight.[1]
Severe: flooding; high water table.	Severe: high water table.	Severe: high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.
Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock.
Severe: 1½ to 3 feet to bedrock; slope.	Severe: slope	Moderate: slope	Severe: 1½ to 3 feet to bedrock.	Severe: 1½ to 3 feet to bedrock.
Severe: 1½ to 3 feet to bedrock; slope.	Severe: slope	Severe: slope	Severe: 1½ to 3 feet to bedrock; slope.	Severe: 1½ to 3 feet to bedrock; slope.
Moderate: 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock.	Slight	Moderate: 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock.
Severe: slope	Severe: slope	Moderate: slope	Moderate: 3½ to 6 feet to bedrock; slope.	Moderate: 3½ to 6 feet to bedrock; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: stoniness	Slight	Severe: slope	Severe: stoniness; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; 1½ to 4 feet to bedrock.	Severe: slope; stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbol	Onsite disposal of sewage effluent	Sewage lagoons	Locations of homes and other buildings of three stories or less	Landscaping and lawns at homesites
Brinkerton:				
(BuA)	Severe: high water table.	Slight	Severe: high water table.	Severe: high water table.
(BuB2)	Severe: high water table.	Moderate: slope	Severe: high water table.	Severe: high water table.
Buchanan:				
(BvB)	Severe: seasonal high water table; slow permeability.	Moderate: slope	Moderate: seasonal high water table.	Slight
(BwB)	Severe: seasonal high water table; slow permeability.	Moderate: slope	Moderate: seasonal high water table; stoniness.	Severe: stoniness
Burgin (By)	Severe: high water table.	Slight [1]	Severe: high water table.	Severe: high water table.
Chester:				
(ChB2)	Slight	Severe: moderately rapid permeability.	Slight	Slight
(ChC2)	Moderate: slope	Severe: slope; moderately rapid permeability.	Moderate: slope	Moderate: slope
(ChC3)	Moderate: slope	Severe: slope; moderately rapid permeability.	Moderate: slope	Severe: slope; severe erosion.
(ChD2, ChE3)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(CnB)	Moderate: stoniness	Severe: moderately rapid permeability.	Moderate: stoniness	Moderate: stoniness
(CnD, CnF)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Comly:				
(CoA)	Severe: seasonal high water table; moderately slow permeability.	Slight	Moderate: seasonal high water table.	Slight
(CoB2)	Severe: seasonal high water table; moderately slow permeability.	Moderate: slope	Moderate: seasonal high water table; slope.	Slight
Croton:				
(CrA)	Severe: high water table; slow permeability.	Slight	Severe: high water table.	Severe: high water table.
(CrB2)	Severe: high water table; slow permeability.	Moderate: slope	Severe: high water table.	Severe: high water table.
Duffield:				
(DfA)	Slight [1]	Moderate: [1] moderate permeability.	Slight	Slight
(DfB2)	Slight [1]	Moderate: [1] moderate permeability; slope.	Slight	Slight
(DfC2)	Moderate: [1] slope	Severe: [1] slope	Moderate: slope	Moderate: slope
(DfD2)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Duffield and Hagerstown:				
(DhC3)	Moderate: [1] 3½ to 6 feet to bedrock.	Severe: [1] slope	Moderate: 3½ to 6 feet to bedrock; slope.	Severe: slope; severe erosion.
(DhE3)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Edgemont:				
(EcB2)	Moderate: 3½ to 7 feet to bedrock.	Severe: moderately rapid permeability.	Moderate: 3½ to 7 feet to bedrock.	Slight
(EcC2)	Moderate: 3½ to 7 feet to bedrock; slope.	Severe: slope; moderately rapid permeability.	Moderate: 3½ to 7 feet to bedrock; slope.	Moderate: slope
(EcD2)	Severe: slope	Severe: slope	Severe: slope	Severe: slope

See footnote at end of table.

for community developments—Continued

Streets and parking lots for subdivisions	Athletic fields	Parks and extensively used play areas	Sanitary land fill	Cemeteries
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: seasonal high water table; slope.	Moderate: slope	Slight	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.
Moderate: seasonal high water table; slope.	Moderate: slope; stoniness.	Slight	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: slope	Moderate: slope	Slight	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope; severe erosion.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: slope	Severe: stoniness	Moderate: stoniness	Moderate: stoniness	Severe: stoniness.
Severe: slope	Severe: slope	Severe: slope; stoniness	Severe: slope	Severe: slope; stoniness.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability.
Severe: high water table	Severe: high water table.	Severe: high water table.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; slow permeability.	Severe: high water table; slow permeability.
Slight	Slight	Slight	Slight [1]	Slight.
Moderate: slope	Moderate: slope	Slight	Slight [1]	Slight.
Severe: slope	Severe: slope	Moderate: slope	Moderate: [1] slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Moderate: slope	Moderate: [1] 3½ to 6 feet to bedrock; slope.	Severe: slope; severe erosion.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: 3½ to 7 feet to bedrock; slope.	Moderate: slope	Slight	Moderate: 3½ to 7 feet to bedrock.	Moderate: 3½ to 7 feet to bedrock.
Severe: slope	Severe: slope	Moderate: slope	Moderate: 3½ to 7 feet to bedrock.	Moderate: 3½ to 7 feet to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbol	Onsite disposal of sewage effluent	Sewage lagoons	Locations of homes and other buildings of three stories or less	Landscaping and lawns at homesites
Edgemont and Dekalb:				
(EdB)	Severe: 2 to 3½ feet to bedrock.	Severe: moderately rapid permeability; 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.	Severe: coarse fragments.
(EdD)	Severe: 2 to 3½ feet to bedrock; slope.	Severe: 2 to 3½ feet to bedrock; slope.	Severe: 2 to 3½ feet to bedrock; slope.	Severe: slope; coarse fragments.
(EdF)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Fogelsville:				
(FoA)	Slight [1]	Moderate: [1] moderate permeability.	Slight	Slight
(FoB2)	Slight [1]	Moderate: [1] moderate permeability.	Slight	Slight
(FoC2)	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope
Glenville:				
(GIA)	Severe: moderately slow permeability; seasonal high water table.	Slight	Moderate: seasonal high water table.	Slight
(G.B2)	Severe: moderately slow permeability; seasonal high water table.	Moderate: slope	Moderate: seasonal high water table.	Slight
Hagerstown:				
(HaB2)	Moderate: [1] 3½ to 6 feet to bedrock.	Moderate: [1] slope; moderate permeability.	Moderate: 3½ to 6 feet to bedrock.	Slight
(HaC2)	Moderate: [1] slope; 3½ to 6 feet to bedrock.	Severe: [1] slope	Moderate: slope; 3½ to 6 feet to bedrock.	Moderate: slope
Klinesville:				
(KIB2)	Severe: 1 to 1½ feet to bedrock.	Severe: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.
(KIC2)	Severe: 1 to 1½ feet to bedrock.	Severe: slope; 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.
(KID2, KIF2)	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope	Severe: slope
Laidig:				
(LaB2)	Severe: moderately slow permeability.	Moderate: slope	Slight	Slight
(LaC2)	Severe: moderately slow permeability.	Severe: slope	Moderate: slope	Moderate: slope
(LdB)	Severe: moderately slow permeability.	Moderate: slope	Moderate: stoniness	Moderate: stoniness
(LdD)	Severe: slope; moderately slow permeability.	Severe: slope	Severe: slope	Severe: slope
Lamington (Lg)	Severe: high water table.	Slight	Severe: high water table.	Severe: high water table.
Lehigh:				
(LhA, LhB2)	Severe: seasonal high water table; moderately slow permeability.	Moderate: 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock.	Slight
(LhC3)	Severe: seasonal high water table; moderately slow permeability.	Severe: slope	Severe: slope	Severe: severe erosion.
Lewisberry:				
(LrB2)	Moderate: 3½ to 10 feet to bedrock.	Severe: moderately rapid permeability.	Moderate: 3½ to 10 feet to bedrock.	Moderate: gravelly
(LrC2)	Moderate: slope; 3½ to 10 feet to bedrock.	Severe: slope; moderately rapid permeability.	Moderate: slope; 3½ to 10 feet to bedrock.	Moderate: slope; gravelly.

See footnote at end of table.

for community developments—Continued

Streets and parking lots for subdivisions	Athletic fields	Parks and extensively used play areas	Sanitary land fill	Cemeteries
Severe: 2 to 3½ feet to bedrock.	Moderate: stoniness	Moderate: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock; stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: 2 to 3½ feet to bedrock; slope.	Severe: 2 to 3½ feet to bedrock; slope; stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Slight	Slight [1]	Slight.
Moderate: slope	Moderate: slope	Slight	Slight [1]	Slight.
Severe: slope	Severe: slope	Moderate: slope	Moderate:[1] slope	Moderate: slope.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table.
Moderate: slope; seasonal high water table.	Moderate: seasonal high water table.	Slight	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table.
Moderate: slope; 3½ to 6 feet to bedrock.	Moderate: slope	Slight	Moderate:[1] 3½ to 6 feet to bedrock.	Moderate: 3½ to 6 feet to bedrock.
Severe: slope	Severe: slope	Moderate: slope	Moderate:[1] slope; 3½ to 6 feet to bedrock.	Moderate: slope; 3½ to 6 feet to bedrock.
Moderate: slope; 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.	Slight	Severe: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.
Severe: slope	Severe: slope	Moderate: slope	Severe: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Slight	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope; moderately slow permeability.	Moderate: slope; moderately slow permeability.
Moderate: slope	Moderate: slope; stoniness.	Slight	Moderate: stoniness; moderately slow permeability.	Severe: stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: seasonal high water table.	Moderate: seasonal high water table.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table; moderately slow permeability.
Severe: seasonal high water table; 2 to 6 feet to bedrock.	Severe: slope	Moderate: slope	Severe: seasonal high water table.	Severe: seasonal high water table; moderately slow permeability; severe erosion.
Moderate: slope; 3½ to 10 feet to bedrock.	Moderate: slope	Slight	Moderate: 3½ to 10 feet to bedrock.	Moderate: 3½ to 10 feet to bedrock.
Severe: slope; 3½ to to 10 feet to bedrock.	Severe: slope	Moderate: slope	Moderate: slope; 3½ to 10 feet to bedrock.	Moderate: slope; 3½ to 10 feet to bedrock.

TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbol	Onsite disposal of sewage effluent	Sewage lagoons	Locations of homes and other buildings of three stories or less	Landscaping and lawns at homesites
Lewisberry—Continued				
(LrC3)	Moderate: slope; 3½ to 10 feet bedrock.	Severe: slope; moderately rapid permeability.	Moderate: slope; 3½ to 10 feet bedrock.	Severe: severe erosion; slope.
(LrD2, LrD3, LrE3)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(LsB)	Moderate: slope; 3½ to 10 feet to bedrock.	Severe: moderately rapid permeability.	Moderate: stoniness; 3½ to 10 feet to bedrock.	Moderate: stoniness; surface texture.
(LsD)	Severe: slope	Severe: slope; moderately rapid permeability.	Severe: slope	Severe: slope
(LsF)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Lindside (Lt)	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
Litz:				
(LzB2)	Severe: 1½ to 2½ feet to bedrock.	Severe: 1½ to 2½ feet to bedrock.	Moderate: 1½ to 2½ feet to bedrock.	Moderate: 1½ to 2½ feet to bedrock.
(LzC2)	Severe: 1½ to 2½ feet to bedrock.	Severe: slope; 1½ to 2½ feet to bedrock.	Moderate: slope; 1½ to 2½ feet to bedrock.	Moderate: slope; 1½ to 2½ feet to bedrock.
(LzD2)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
(LzE3)	Severe: slope	Severe: slope	Severe: slope	Severe: slope; severe erosion.
Melvin (Ml)	Severe: flooding; high water table.	Severe: flooding	Severe: flooding; high water table.	Severe: flooding; high water table.
Murrill:				
(MrA3, MuA)	Slight [1]	Moderate: [1] moderate permeability.	Slight	Slight
(MuB2)	Slight [1]	Moderate: [1] moderate permeability.	Slight	Slight
(MuC2)	Moderate: [1] slope	Severe: slope	Moderate: slope	Moderate: slope
(MvB)	Slight: [1] slope	Moderate: [1] slope	Moderate: stoniness	Moderate: stoniness
(MvC)	Moderate: [1] slope	Severe: [1] slope	Moderate: slope; stoniness.	Moderate: slope; stoniness.
Neshaminy:				
(NaC3)	Moderate: slope	Severe: slope	Moderate: slope	Severe: severe erosion.
(NaD3)	Severe: slope	Severe: slope	Severe: slope	Severe: slope; severe erosion.
(NeB2)	Slight	Moderate: slope; moderate permeability.	Slight	Slight
(NeC2)	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope
(NsD)	Severe: slope	Severe: slope	Severe: slope; stoniness.	Severe: slope; stoniness.
(NsF)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Penn:				
(PeB2)	Severe: 2 to 3½ feet to bedrock.	Severe: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock.
(PeC2)	Severe: 2 to 3½ feet to bedrock.	Severe: slope; 2 to 3½ feet to bedrock.	Moderate: slope; 2 to 3½ feet to bedrock.	Moderate: slope; 2 to 3½ feet to bedrock.
(PeD2)	Severe: slope; 2 to 3½ feet to bedrock.	Severe: slope	Severe: slope	Severe: slope
Philo:				
(Ph)	Severe: flooding; seasonal high water table.	Severe: flooding	Severe: flooding	Severe: acid material.
(Pl)	Severe: flooding; seasonal high water table.	Severe: flooding	Severe: flooding	Moderate: flooding
Pope (Po)	Severe: flooding	Severe: flooding; moderately rapid permeability.	Severe: flooding	Moderate: flooding

See footnote at end of table.

for community developments—Continued

Streets and parking lots for subdivisions	Athletic fields	Parks and extensively used play areas	Sanitary land fill	Cemeteries
Severe: slope; 3½ to 10 feet to bedrock.	Severe: slope	Moderate: slope	Moderate: slope; 3½ to 10 feet to bedrock.	Moderate: 3½ to 10 feet to bedrock; slope; severe erosion.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope; stoniness.	Slight	Moderate: stoniness; 3½ to 10 feet to bedrock.	Severe: stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: flooding	Moderate: flooding	Moderate: flooding	Severe: flooding	Severe: flooding.
Moderate: 1½ to 2½ feet to bedrock; slope.	Severe: 1½ to 2½ feet to bedrock.	Moderate: 1½ to 2½ feet to bedrock.	Moderate: 1½ to 2½ feet to bedrock.	Moderate: 1½ to 2½ feet to bedrock.
Severe: slope	Severe: slope	Moderate: slope	Moderate: 1½ to 2½ feet to bedrock.	Moderate: 1½ to 2½ feet to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; severe erosion.
Severe: flooding; high water table.	Severe: flooding	Severe: high water table.	Severe: flooding; high water table.	Severe: flooding; high water table.
Slight	Slight	Slight	Slight [1]	Slight.
Moderate: slope	Moderate: slope	Slight	Slight [1]	Slight.
Severe: slope	Severe: slope	Moderate: slope	Moderate: [1] slope	Moderate: slope.
Moderate: slope	Moderate: stoniness	Slight	Moderate: [1] stoniness	Severe: stoniness.
Severe: slope	Severe: slope	Moderate: slope	Moderate: [1] slope; stoniness.	Severe: stoniness.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Severe: slope; severe erosion.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope; severe erosion.
Moderate: slope	Moderate: slope	Slight	Slight	Slight.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; stoniness	Severe: slope; stoniness.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: slope; 2 to 3½ feet to bedrock.	Moderate: slope; 2 to 3½ feet to bedrock.	Slight	Moderate: 2 to 3½ feet to bedrock.	Moderate: 2 to 3½ feet to bedrock.
Severe: slope	Severe: slope	Moderate: slope	Moderate: slope; 2 to 3½ feet to bedrock.	Moderate; slope; 2 to 3½ feet to bedrock.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding; seasonal high water table.	Severe: flooding.
Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding; seasonal high water table.	Severe: flooding.
Severe: flooding	Severe: flooding	Moderate: flooding	Severe: flooding	Severe: flooding.

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TABLE 7.—*Estimated degree and kinds of limitations*

Soil series and map symbol	Onsite disposal of sewage effluent	Sewage lagoons	Locations of homes and other buildings of three stories or less	Landscaping and lawns at homesites
Raritan (RaB)	Severe: moderately slow permeability; seasonal high water table.	Slight	Moderate: seasonal high water table.	Slight
Readington:				
(ReA)	Severe: moderately slow permeability; seasonal high water table.	Slight	Moderate: seasonal high water table.	Slight
(ReB2)	Severe: moderately slow permeability; seasonal high water table.	Moderate: slope	Moderate: seasonal high water table.	Slight
Reaville:				
(RlA2)	Severe: 1½ to 3 feet to bedrock; slow permeability; seasonal high water table.	Severe: 1½ to 3 feet to bedrock.	Moderate: 1½ to 3 feet to bedrock; seasonal high water table.	Moderate: 1½ to 3 feet to bedrock.
(RlB2)	Severe: 1½ to 3 feet to bedrock; slow permeability; seasonal high water table.	Severe: 1½ to 3 feet to bedrock; slope.	Moderate: 1½ to 3 feet to bedrock; seasonal high water table.	Moderate: 1½ to 3 feet to bedrock.
Rowland (Ro)	Severe: flooding; seasonal high water table.	Severe: flooding	Severe: flooding	Moderate: flooding
Rubble land (Ru)	Severe: stoniness	Severe: slope; stoniness.	Severe: stoniness	Severe: stoniness
Ryder:				
(RyA2, RyB2)	Severe: 2 to 3 feet to bedrock.	Severe: 2 to 3 feet to bedrock.	Moderate: 2 to 3 feet to bedrock.	Moderate: 2 to 3 feet to bedrock.
(RyC3)	Severe: 2 to 3 feet to bedrock.	Severe: 2 to 3 feet to bedrock; slope	Moderate: 2 to 3 feet to bedrock.	Severe: severe erosion; slope.
Washington:				
(WaA2)	Slight [1]	Moderate: [1] moderate permeability.	Slight	Slight
(WaB2)	Slight [1]	Moderate: [1] slope; moderate permeability.	Slight	Slight
(WaC2)	Moderate: [1] slope	Severe: [1] slope	Moderate: slope	Moderate: slope
Watson (WcA)	Severe: seasonal high water table; slow permeability.	Slight	Moderate: seasonal high water table.	Slight
Weikert-Berks:				
(WeB2) (Based on Weikert properties because those properties are most limiting.)	Severe: 1 to 1½ feet to bedrock.	Severe: 1 to 1½ feet to bedrock; rapid permeability.	Moderate: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.
(WeC2)	Severe: 1 to 1½ feet to bedrock.	Severe: slope	Moderate: slope; 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.
(WeD2)	Severe: 1 to 1½ feet to bedrock; slope.	Severe: slope	Severe: slope	Severe: slope
(WeF2)	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Wiltshire:				
(WsA)	Severe: seasonal high water table; slow permeability.	Slight	Moderate: seasonal high water table.	Slight
(WsB2)	Severe: seasonal high water table; slow permeability.	Moderate: slope	Moderate: seasonal high water table.	Slight

[1] Ground water can become contaminated by seepage through rapidly permeable fractured rock, or cavernous limestone.

for community developments —Continued

Streets and parking lots for subdivisions	Athletic fields	Parks and extensively used play areas	Sanitary land fill	Cemeteries
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight.	Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table.
Moderate: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.	Slight.	Moderate: moderately slow permeability; seasonal high water table.	Moderate: seasonal high water table.
Moderate: slope; seasonal high water table.	Moderate: slope; seasonal high water table; moderately slow permeability.	Slight.	Moderate: moderately slow permeability; seasonal high water table.	Moderate: seasonal high water table.
Moderate: 1½ to 3 feet to bedrock; seasonal high water table.	Severe: slow permeability; seasonal high water table.	Moderate: 1½ to 3 feet to bedrock.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.
Moderate: 1½ to 3 feet to bedrock; seasonal high water table.	Severe: slow permeability; seasonal high water table.	Moderate: 1½ to 3 feet to bedrock.	Severe: slow permeability; seasonal high water table.	Severe: slow permeability; seasonal high water table.
Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: flooding.	Severe: flooding.
Severe: slope; stoniness.	Severe: stoniness.	Severe: stoniness.	Severe: stoniness.	Severe: stoniness.
Moderate: 2 to 3 feet to bedrock. Severe: slope.	Severe: 2 to 3 feet to bedrock. Severe: slope.	Moderate: 2 to 3 feet to bedrock. Moderate: slope.	Moderate: 2 to 3 feet to bedrock. Moderate: slope; 2 to 3 feet to bedrock.	Moderate: 2 to 3 feet to bedrock. Severe: severe erosion; slope.
Slight.	Slight.	Slight.	Slight [1].	Slight.
Moderate: slope.	Moderate: slope.	Slight.	Slight [1].	Slight.
Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: [1] slope.	Moderate: slope.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.
Moderate: 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.	Severe: 1 to 1½ feet to bedrock.	Moderate: 1 to 1½ feet to bedrock.
Severe: slope.	Severe: slope.	Severe: 1 to 1½ feet to bedrock.	Severe: 1 to 1½ feet to bedrock.	Moderate: slope; 1 to 1½ feet to bedrock.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope; 1 to 1½ feet to bedrock.	Severe: slope.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Moderate: seasonal high water table.	Severe: slow permeability.	Slight.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.
Moderate: slope; seasonal high water table.	Severe: slow permeability.	Slight.	Severe: seasonal high water table; slow permeability.	Severe: seasonal high water table; slow permeability.

TABLE 8.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Allenwood gravelly silt loam, 2 to 8 percent slopes	870	0. 2
Andover very stony loam, 0 to 8 percent slopes	1, 530	. 3
Athol silt loam, 3 to 8 percent slopes, moderately eroded	2, 770	. 5
Athol silt loam, 8 to 15 percent slopes, moderately eroded	910	. 2
Athol silt loam, 8 to 15 percent slopes, severely eroded	860	. 2
Athol silt loam, 15 to 25 percent slopes, severely eroded	710	. 1
Athol very stony and rocky silt loam, 8 to 25 percent slopes	190	(1)
Atkins silt loam	21, 330	3. 9
Baile silt loam	4, 870	. 9
Baile very stony silt loam	4, 190	. 8
Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded	6, 550	1. 2
Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded	6, 280	1. 1
Bedington shaly silt loam, 15 to 25 percent slopes, moderately eroded	3, 780	. 7
Berks shaly silt loam, 0 to 3 percent slopes, moderately eroded	960	. 2
Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded	24, 400	4. 4
Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded	28, 630	5. 2
Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded	6, 980	1. 3
Berks shaly silt loam, 25 to 35 percent slopes, moderately eroded	4, 020	. 7
Birdsboro silt loam, 2 to 10 percent slopes	1, 620	. 3
Birdsboro-Duffield silt loams, 3 to 10 percent slopes	990	. 2
Bowmansville silt loam	3, 670	. 7
Brandywine channery loam, 3 to 8 percent slopes, moderately eroded	280	. 1
Brandywine channery loam, 8 to 15 percent slopes, moderately eroded	650	. 1
Brandywine channery loam, 15 to 25 percent slopes, moderately eroded	630	. 1
Brecknock channery silt loam, 3 to 8 percent slopes	2, 430	. 4
Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded	1, 880	. 3
Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded	850	. 2
Brecknock very stony silt loam, 0 to 8 percent slopes	450	. 1
Brecknock very stony silt loam, 8 to 25 percent slopes	2, 220	. 4
Brecknock very stony silt loam, 25 to 60 percent slopes	540	. 1
Brinkertown silt loam, 0 to 3 percent slopes	6, 140	1. 1
Brinkertown silt loam, 3 to 8 percent slopes, moderately eroded	2, 460	. 4
Buchanan gravelly loam, 3 to 8 percent slopes	1, 220	. 2
Buchanan very stony loam, 0 to 8 percent slopes	2, 050	. 4
Burgin silt loam, gray surface variant	2, 110	. 4
Chester channery silt loam, 3 to 8 percent slopes, moderately eroded	15, 050	2. 7
Chester channery silt loam, 8 to 15 percent slopes, moderately eroded	12, 390	2. 2
Chester channery silt loam, 8 to 15 percent slopes, severely eroded	2, 770	. 5
Chester channery silt loam, 15 to 25 percent slopes, moderately eroded	2, 900	. 5
Chester channery silt loam, 15 to 30 percent slopes, severely eroded	4, 470	. 8
Chester very stony silt loam, 0 to 8 percent slopes	3, 040	. 5
Chester very stony silt loam, 8 to 25 percent slopes	22, 410	4. 0
Chester very stony silt loam, 25 to 55 percent slopes	5, 640	1. 0
Comly silt loam, 0 to 3 percent slopes	2, 020	. 4
Comly silt loam, 3 to 8 percent slopes, moderately eroded	3, 710	. 7
Croton silt loam, 0 to 3 percent slopes	3, 300	. 6
Croton silt loam, 3 to 8 percent slopes, moderately eroded	620	. 1
Duffield silt loam, 0 to 3 percent slopes	2, 550	. 5
Duffield silt loam, 3 to 8 percent slopes, moderately eroded	32, 280	5. 8
Duffield silt loam, 8 to 15 percent slopes, moderately eroded	3, 930	. 7
Duffield silt loam, 15 to 25 percent slopes, moderately eroded	760	. 1
Duffield and Hagerstown soils, 8 to 15 percent slopes, severely eroded	3, 430	. 6
Duffield and Hagerstown soils, 15 to 30 percent slopes, severely eroded	1, 610	. 3
Edgemont channery loam, 3 to 8 percent slopes, moderately eroded	2, 040	. 4
Edgemont channery loam, 8 to 15 percent slopes, moderately eroded	2, 980	. 5
Edgemont channery loam, 15 to 25 percent slopes, moderately eroded	1, 200	. 2
Edgemont and DeKalb very stony sandy loams, 0 to 8 percent slopes	1, 040	. 2
Edgemont and DeKalb very stony sandy loams, 8 to 25 percent slopes	15, 010	2. 7
Edgemont and DeKalb very stony sandy loams, 25 to 70 percent slopes	8, 860	1. 6
Fogelsville silt loam, 0 to 3 percent slopes	550	. 1
Fogelsville silt loam, 3 to 8 percent slopes, moderately eroded	3, 620	. 7
Fogelsville silt loam, 8 to 15 percent slopes, moderately eroded	460	. 1
Glenville silt loam, 0 to 3 percent slopes	1, 470	. 3
Glenville silt loam, 3 to 8 percent slopes, moderately eroded	1, 710	. 3
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	1, 640	. 3
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	840	. 2
Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded	1, 500	. 3
Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded	2, 840	. 5
Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded	3, 040	. 6
Klinesville shaly silt loam, 25 to 45 percent slopes, moderately eroded	1, 270	. 2
Laidig channery loam, 3 to 8 percent slopes, moderately eroded	1, 280	. 2
Laidig channery loam, 8 to 15 percent slopes, moderately eroded	1, 330	. 2
Laidig very stony loam, 0 to 8 percent slopes	1, 320	. 2
Laidig very stony loam, 8 to 25 percent slopes	17, 950	3. 2
Lamington silt loam	740	. 1
Lehigh silt loam, 0 to 3 percent slopes	590	. 1
Lehigh silt loam, 3 to 8 percent slopes, moderately eroded	610	. 1
Lehigh silt loam, 8 to 15 percent slopes, severely eroded	350	. 1
Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded	7, 410	1. 3
Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded	3, 410	. 6
Lewisberry gravelly sandy loam, 8 to 15 percent slopes, severely eroded	5, 100	. 9
Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	1, 900	. 3

See footnote at end of table.

TABLE 8.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent
Lewisberry gravelly sandy loam, 15 to 25 percent slopes, severely eroded	3, 840	. 7
Lewisberry gravelly sandy loam, 25 to 35 percent slopes, severely eroded	850	. 2
Lewisberry very stony sandy loam, 0 to 8 percent slopes	1, 350	. 2
Lewisberry very stony sandy loam, 8 to 25 percent slopes	17, 020	3. 1
Lewisberry very stony sandy loam, 25 to 60 percent slopes	3, 760	. 7
Lindside silt loam	2, 060	. 4
Litz shaly silt loam, 3 to 8 percent slopes, moderately eroded	3, 850	. 7
Litz shaly silt loam, 8 to 15 percent slopes, moderately eroded	6, 350	1. 1
Litz shaly silt loam, 15 to 25 percent slopes, moderately eroded	1, 890	. 3
Litz shaly silt loam, 15 to 30 percent slopes, severely eroded	1, 900	. 3
Made land, granite and gneiss materials, sloping	420	. 1
Made land, granite and gneiss materials, strongly sloping	1, 470	. 3
Made land, limestone materials, sloping	8, 800	1. 6
Made land, limestone materials, strongly sloping	740	. 1
Made land, shale and sandstone materials, sloping	1, 850	. 3
Melvin silt loam	3, 920	. 7
Murrill gravelly clay loam, 0 to 3 percent slopes, severely eroded	700	. 1
Murrill gravelly loam, 0 to 3 percent slopes	1, 650	. 3
Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded	6, 470	1. 2
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded	1, 330	. 2
Murrill very stony loam, 0 to 8 percent slopes	220	[1]
Murrill very stony loam, 8 to 25 percent slopes	340	. 1
Neshaminy silty clay loam, 8 to 15 percent slopes, severely eroded	920	. 2
Neshaminy silty clay loam, 15 to 25 percent slopes, severely eroded	1, 060	. 2
Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded	1, 320	. 2
Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded	880	. 2
Neshaminy very stony silt loam, 5 to 25 percent slopes	5, 510	1. 0
Neshaminy very stony silt loam, 25 to 60 percent slopes	2, 190	. 4
Penn shaly soils, 3 to 8 percent slopes, moderately eroded	8, 980	1. 6
Penn shaly soils, 8 to 15 percent slopes, moderately eroded	5, 720	1. 0
Penn shaly soils, 15 to 25 percent slopes, moderately eroded	530	. 1
Philo loam, coal overwash	1, 970	. 4
Philo silt loam	2, 350	. 4
Pope silt loam	690	. 1
Raritan silt loam, 0 to 5 percent slopes	940	. 2
Readington silt loam, 0 to 3 percent slopes	1, 110	. 2
Readington silt loam, 3 to 8 percent slopes, moderately eroded	930	. 2
Reaville shaly silt loam, 0 to 3 percent slopes, moderately eroded	740	. 1
Reaville shaly silt loam, 3 to 8 percent slopes, moderately eroded	730	. 1
Rowland silt loam	930	. 2
Rubble land	7, 860	1. 4
Ryder silt loam, 0 to 3 percent slopes, moderately eroded	540	. 1
Ryder silt loam, 3 to 8 percent slopes, moderately eroded	4, 040	. 7
Ryder silt loam, 8 to 15 percent slopes, severely eroded	2, 690	. 5
Washington silt loam, 0 to 3 percent slopes, moderately eroded	540	. 1
Washington silt loam, 3 to 8 percent slopes, moderately eroded	5, 780	1. 1
Washington silt loam, 8 to 15 percent slopes, moderately eroded	600	. 1
Watson silt loam, 0 to 3 percent slopes	860	. 2
Weikert-Berks shaly silt loams, 3 to 8 percent slopes, moderately eroded	5, 700	1. 0
Weikert-Berks shaly silt loams, 8 to 15 percent slopes, moderately eroded	17, 020	3. 1
Weikert-Berks shaly silt loams, 15 to 25 percent slopes, moderately eroded	14, 040	2. 5
Weikert-Berks shaly silt loams, 25 to 60 percent slopes, moderately eroded	11, 820	2. 1
Wiltshire silt loam, 0 to 3 percent slopes	3, 270	. 6
Wiltshire silt loam, 3 to 8 percent slopes, moderately eroded	1, 670	. 3
Airstrip	150	[1]
Gravel pits	520	. 1
Iron pits	230	[1]
Slag dumps	160	[1]
Water	1, 410	. 3
Quarry	820	. 2
Total	552, 960	100. 0

[1] Less than 0.05 percent.

a fragipan layer that cannot be readily penetrated by roots. The fragipan further decreases the effective depth to which roots can penetrate. Also, the effective depth of some of the soils is limited by a seasonal high water table.

Accelerated erosion is active on many soils of the county, especially on cultivated soils that are sloping or steep. Typically, a moderately eroded or severely eroded soil has a thinner, lighter colored surface layer than an uneroded soil of the same soil type and slope. Also, the surface layer contains less organic matter and the root zone is shallower.

Allenwood Series

The Allenwood series consists of deep, well-drained, nearly level to gently sloping soils in fan-shaped areas on high terraces. These soils are mainly between Mohrsville and Shoemakersville. The areas branch out in tongues, however, that extend southward to Reading along the Schuylkill River. These soils have formed in alluvial material derived from gray quartzite and red or gray sandstone or shale.

In a cultivated soil typical of the Allenwood series, the plow layer is strongly acid gravelly silt loam about

8 inches thick. The upper part of the subsoil, extending to a depth of 32 inches, is strong-brown to yellowish-red, strongly acid silt loam to silty clay loam that has blocky structure. The lower part, between a depth of 32 and more than 48 inches, is red gravelly silt loam that has blocky structure. The profile has a large amount of gravel throughout.

Runoff is slow to medium, and the Allenwood soils are slightly susceptible to erosion. Permeability is moderately rapid. The available moisture capacity is high.

Most of the acreage is in field crops or pasture.

Representative profile of Allenwood gravelly silt loam, 2 to 8 percent slopes, in a cultivated field near Shoemakersville:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) gravelly silt loam; 25 percent of horizon is waterworn gravel; moderate, fine, granular structure in upper part, but thin platy structure in lower 3 inches; friable when moist; strongly acid (pH 5.5); abrupt, smooth boundary. 6 to 8 inches thick.

B1—8 to 19 inches, strong-brown (7.5YR 5/8) silt loam; 20 percent of horizon consists of rounded coarse fragments as much as 6 inches in diameter; moderate, fine, subangular blocky structure; friable when moist; thin, discontinuous clay films; strongly acid (pH 5.4); clear, wavy boundary. 8 to 12 inches thick.

B2t—19 to 32 inches, yellowish-red (5YR 5/6) silty clay loam; few cobblestones; moderate, coarse, blocky structure breaking to fine subangular blocky structure; firm when moist, sticky and plastic when wet; thick patches of clay films on peds and lining pores; strongly acid (pH 5.3); clear, irregular boundary. 8 to 14 inches thick.

B3—32 to 48 inches +, red (2.5YR 4/6) gravelly silt loam; 30 percent of horizon is gravel and cobblestones; weak, fine, blocky structure; friable when moist, sticky and slightly plastic when wet; strongly acid (pH 5.1).

The color of the B2t horizon ranges from strong brown to red, and the texture of that horizon ranges from silt loam to silty clay loam or clay loam. Depth to bedrock ranges from 4 to 20 feet. The content of gravel and cobblestones ranges from 15 to 35 percent. Reaction ranges from medium acid to very strongly acid.

Allenwood soils are adjacent to shallow, well drained Weikert, moderately deep, well drained Berks, and moderately well drained Watson soils. In contrast to the Watson soils, which are mottled between a depth of 12 and 36 inches, the Allenwood soils are free of mottling of low chroma to a depth of at least 36 inches.

Allenwood gravelly silt loam, 2 to 8 percent slopes (AgB).—This is the only Allenwood soil mapped in Berks County. It occurs in the vicinity of the Schuylkill River, near Shoemakersville and south to Reading. The profile is the one described as typical for the Allenwood series.

Included with this soil in mapping were small areas of nearly level soils and small areas of more sloping soils. Also included were areas of severely eroded soils. These severely eroded spots require more careful management than is needed for this Allenwood soil.

This Allenwood soil is suited to most of the crops commonly grown in the county. (Capability unit IIe–2)

Andover Series

The Andover series consists of deep, poorly drained, nearly level or gently sloping soils. These soils have formed in mixed colluvial material derived from acid shale, sandstone, and quartzite. They are along drainageways and on the lower slopes of Blue Mountain. Many stones and boulders are on the surface.

In a wooded soil typical of the Andover series, the surface layer is covered with undecayed leaf litter underlain by a thin layer of black humus. The mineral surface layer is gray very stony loam about 5 inches thick. The upper part of the subsoil is light brownish-gray, very strongly acid gravelly loam that has platy or blocky structure and grades to grayish-brown clay loam at a depth of about 12 inches. The lower part, between a depth of 23 and more than 53 inches, is brown gravelly clay loam. Grayish and brownish streaks and spots throughout the solum indicate that water stands in these soils for long periods.

Permeability throughout the profile is slow, and surface runoff is slow. The water table is high during most of the year.

Most areas of Andover soils are very stony and are under forest. Along the outer edges of colluvial fans, however, some areas have been cleared and are farmed.

Representative profile of Andover very stony loam, 0 to 8 percent slopes, in a wooded area near the Strausstown Rod and Gun Club in Upper Tulpehocken Township:

O1—3 inches to 1 inch, undecayed leaf litter from hardwoods.

O2—1 inch to 0, black layer of humus containing some intermixed mineral matter.

A2—0 to 5 inches, gray (10YR 5/1) very stony loam; 10 to 15 percent of horizon is sandstone and quartzite pebbles and cobblestones; common, medium, distinct mottles of light brownish gray (2.5Y 6/2); moderate, fine, granular structure; very friable when moist, slightly sticky and nonplastic when wet; very strongly acid (pH 4.8); abrupt, smooth boundary. 4 to 6 inches thick.

B21tg—5 to 12 inches, light brownish-gray (2.5Y 6/2) gravelly loam; 15 percent of horizon is sandstone and quartzite pebbles; common, medium, distinct mottles of light gray (10YR 6/1) and strong brown (7.5YR 5/6); weak, thin and medium, platy structure breaking to moderate, very fine, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; continuous coatings of light brownish-gray (2.5Y 6/2) silt and clay on the peds; very strongly acid (pH 4.8); clear, wavy boundary. 7 to 8 inches thick.

B22tg—12 to 23 inches, grayish-brown (10YR 5/2) clay loam; many, coarse, prominent mottles of strong brown (7.5YR 5/6) and yellowish red (5YR 5/6); weak, coarse, prismatic structure; gray (10YR 6/1) coatings on prism surfaces; firm when moist, slightly sticky and slightly plastic when wet; common thin clay films; very strongly acid (pH 4.8); clear, wavy boundary. 10 to 13 inches thick.

Bxg—23 to 53 inches +, brown (7.5YR 5/2) gravelly clay loam; 25 percent of horizon is coarse fragments of sandstone, quartzite, and shale; many, coarse, distinct mottles of strong brown (7.5YR 5/6) and gray (N 6/0); moderate, coarse, prismatic structure breaking to strong, medium and coarse, subangular blocky and weak, medium, platy structure; prisms and blocks coated with gray (10YR 6/1) silt and clay films; very firm when moist, sticky and slightly plastic when wet; very strongly acid (pH 4.6).

The A2 horizon typically has a hue of 10YR, a value of 4 or 5, and chroma of 1 or 2. The B horizons are gleyed and are distinctly or prominently mottled. They have colors of 7.5YR or 10YR to 2.5Y in hue. The texture of the B2tg horizon is commonly clay loam, but it ranges to coarse silt loam or sandy clay loam. Depth to the fragipan ranges from 20 to 30 inches. The content of coarse fragments ranges from 5 to 40 percent, by volume.

Andover soils are in a drainage sequence that includes the deep, well drained Laidig soils and the deep, moderately well drained Buchanan soils. In contrast to the Laidig and Buchanan soils, they are mottled to the surface. Andover soils are similar to the Brinkerton in drainage characteristics, but they are coarser textured throughout the profile than are the Brinkerton soils, and they are generally more stony or gravelly.

Andover very stony loam, 0 to 8 percent slopes (AnB).—This gently sloping soil lies at the foot of Blue Mountain. It is the only soil of the Andover series mapped in Berks County. Its profile is the one described as typical for the Andover series.

The very stony surface layer and poor drainage are the major limitations of this soil. Some areas have been cleared and are cultivated or used for pasture. In general, however, the stones and high water table limit the use of this soil to trees, or the areas can be used for pasture if they have been cleared. Good management of the trees or pasture is needed. Surface drains can be used to improve some pastures, but good management is necessary if the cost of drainage is to be worth while. (Capability unit VIIs-2)

Athol Series

The Athol series consists of well-drained, medium-textured soils that have formed in material weathered from red, calcareous conglomerate. These soils are near Yellow House, in the southeastern part of the county, and near Bally in the eastern part. They are deep in most places, but ledges of rock crop out in many areas, and large rocks are common.

In a cultivated soil typical of the Athol series, the plow layer is dark-brown silt loam about 8 inches thick. The subsoil between a depth of 8 and 24 inches is reddish-brown shaly silt loam or shaly clay loam that has blocky structure. Below a depth of 24 inches, the subsoil is reddish-brown shaly loam that has thick platy or fine blocky structure and has black coatings of iron and manganese on the peds. The shaly loam grades to slightly coarser textured material with increasing depth, and finally to soft, red conglomerate below a depth of 50 inches. The profile contains many coarse fragments.

Runoff ranges from slow, in the gently sloping Athol soils, to rapid or very rapid in the moderately steep ones. Permeability is moderate to moderately rapid. The available moisture capacity is generally high but is somewhat lower in the severely eroded areas than in other places.

Athol soils are easily tilled. Most of these soils are suited to the crops commonly grown in the county.

Representative profile of Athol silt loam, 8 to 15 percent slopes, moderately eroded, in a cultivated field in Amity Township, 1.4 miles southeast of Yellow House along Star Route No. 662. (This is the location of profile S62 Pa-6-4 (1-5) sampled for laboratory characterization analysis, tables 10 and 11 in the section "Laboratory Determinations.") :

Ap—0 to 8 inches, dark-brown (7.5YR 4/2) silt loam; 5 percent of horizon consists of fragments of gravel and shale; very fine granular structure; friable when moist, slightly sticky when wet; medium acid (pH 6.0 where lime has been applied); abrupt, wavy boundary. 6 to 11 inches thick.

B21t—8 to 16 inches, reddish-brown (5YR 4/3) shaly clay loam; 15 to 20 percent of horizon is coarse fragments; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common thin clay films; slightly acid (pH 6.2); gradual, wavy boundary. 7 to 9 inches thick.

B22t—16 to 24 inches, reddish-brown (5YR 4/3) shaly silt loam; 20 to 25 percent of horizon is coarse fragments; weak, medium, blocky structure; friable when moist, but firmer than the soil material in the B21t horizon; slightly sticky and slightly plastic when wet; clay films on the larger surfaces and a few coatings of iron and manganese; slightly acid (pH 6.1); clear, irregular boundary. 6 to 10 inches thick.

B31—24 to 32 inches, reddish-brown (5YR 4/3) shaly loam; 20 to 25 percent of horizon is coarse fragments; moderate, thick, platy structure breaking to fine blocky structure; firm when moist, nonsticky when wet; clay films are moderately thick on the larger surfaces and in pores; coatings of iron and manganese are common; medium acid (pH 5.6); clear, irregular boundary. 6 to 10 inches thick.

B32—32 to 50 inches +, dark reddish-brown (5YR 3/4) shaly loam; 25 percent of horizon is coarse fragments; weak, fine and medium, blocky structure modified by shale fragments; firm when moist, nonsticky when wet; clay films on the large surfaces and in pores; few coatings of iron and manganese; strongly acid (pH 5.5).

The color of the Ap horizon ranges from dark brown to dusky red. The thickness of that layer varies as a result of differences in the depth of plowing, and because of erosion in cultivated fields. Where these soils are under forest, they have an A1 horizon that is thinner and darker colored than the Ap horizon shown in the profile described as typical for the series, and the A1 horizon is underlain by an A2 horizon that is lighter colored than the A1. The color of the B horizons ranges from reddish brown or dark reddish brown to weak red. The colors are generally less red in areas where the proportion of limestone is greatest in the conglomerate than in other areas. The clay films are discontinuous and range from thin to thick. The amount of stone fragments in the B horizons ranges from 5 to 30 percent, and it increases with increasing depth. Thickness of the solum ranges from 33 to 60 inches. Reaction of the plow layer ranges from medium acid to neutral.

Athol soils occur with moderately well drained Readington and poorly drained Croton soils. They also occur with moderately deep or deep Penn and shallow Klinesville soils.

Athol silt loam, 3 to 8 percent slopes, moderately eroded (AsB2).—This soil is similar to the one for which a profile is described as typical for the series, except that it is gently sloping. In places red or gray conglomerate crops out.

Included in mapping were small areas of nearly level soils that have a profile slightly deeper over bedrock than the one described as typical for the series. Also included were small areas of severely eroded soils that have a redder, finer textured surface layer than typical.

Runoff is medium to slow, and permeability is moderate or moderately rapid. The available moisture capacity is high. Further erosion is a moderate hazard.

This soil is well suited to the cultivated crops commonly grown in the county, but past erosion and the danger of further erosion are moderate limitations. In places the outcrops of conglomerate interfere with the efficient use of farm machinery. (Capability unit IIe-1)

Athol silt loam, 8 to 15 percent slopes, moderately eroded (AsC2).—This soil has the profile described as typical for the series. In places outcrops of bedrock are common.

Runoff is medium to rapid, and further erosion is a hazard. Permeability throughout the profile is moderate to moderately rapid. The available moisture capacity is high.

This soil is suited to the crops commonly grown in the county, but it needs protection from further erosion. The outcrops of bedrock interfere with use of farm machinery. (Capability unit IIIe-1)

Athol silt loam, 8 to 15 percent slopes, severely eroded (AsC3).—This soil has lost most of its original surface layer through erosion, and the profile is somewhat thinner than the one described as typical for the series. Tillage has mixed part of the subsoil with the plow layer. As a result, the present plow layer has a lighter color and a finer texture than the original one.

Runoff is medium to rapid, and further erosion is a hazard. The available moisture capacity is somewhat lower than that of the more nearly level and the less eroded Athol soils.

This soil is fairly well suited to crops, but protection from further erosion is needed. The outcrops of bedrock interfere with tillage. (Capability unit IVe-1)

Athol silt loam, 15 to 25 percent slopes, severely eroded (AsD3).—In places most of the original surface layer of this soil has been lost through erosion, and the plow layer now contains much material from the subsoil. The profile is thinner than it was originally. Bedrock crops out in places.

Runoff is rapid or very rapid, and the hazard of further erosion is severe. The available moisture capacity is lower than that of the less eroded Athol soils. Outcrops of bedrock interfere with tillage.

The hazard of further erosion makes this soil unsuitable for cultivation. Pasture is a good long-term use for most of the areas. (Capability unit VIe-1)

Athol very stony and rocky silt loam, 8 to 25 percent slopes (AtD).—This soil occupies many small areas near other Athol soils. Bedrock is nearer the surface than in the profile described as typical for the series, and boulders and ledges are common.

This soil is too stony and ledgy for the growing of cultivated crops to be practical. Most of the areas have been cleared but are reverting to native vegetation. Where farm machinery cannot be used efficiently, trees should be planted. Also, this soil can be used for permanent pasture if the fields are large enough to warrant the cost of management. (Capability unit VIs-1)

Atkins Series

The Atkins series consists of soils that are poorly drained and medium textured. These soils have formed in alluvial sediment that originated in uplands underlain by shale, sandstone, and quartzite. They are along streams that have a slight gradient and that drain the northern and eastern parts of the county. Flooding occurs frequently in spring and during intense thunderstorms.

In a cultivated soil typical of the Atkins series, the plow layer is dark grayish-brown, mottled silt loam about 8 inches thick. It is underlain by a subsurface layer of grayish-brown, mottled silt loam about 3 inches thick. The subsoil has subangular or blocky structure. The upper part, between a depth of 11 and 17 inches, is dark grayish-brown, mottled silt loam. The lower part, between a depth of 17 and 36 inches, is gray, mottled silt loam. The content of sand increases below a depth of about 36 inches. The substratum of dark-brown, mottled loam is at that depth.

Atkins soils are easily tilled but are wet much of the time. Mottling within 8 inches of the surface and throughout the rest of the profile indicates that water stands in these soils during much of the year. Permeability is moderate, and the available moisture capacity is high.

Representative profile of Atkins silt loam in a cultivated field one-half mile north of Berne:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, distinct, yellowish-red (5YR 4/6) mottles; weak, fine, distinct, yellowish-red (5YR 4/6) mottles; weak, fine, granular structure; friable when moist; neutral (pH 6.6 where lime has been applied); abrupt, smooth boundary. 7 to 8 inches thick.

A2g—8 to 11 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine, distinct, yellowish-red (5YR 4/6) mottles; weak, very fine, subangular blocky structure; friable when moist; neutral (pH 6.6); clear, wavy boundary. 3 to 4 inches thick.

B1g—11 to 17 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, faint, yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure; friable when moist; slightly acid (pH 6.1); clear, wavy boundary. 5 to 6 inches thick.

B2g—17 to 30 inches, gray (10YR 5/1) silt loam; few, fine, faint, yellowish-brown (10YR 5/8) mottles; weak, fine, blocky structure; friable when moist, slightly sticky when wet; medium acid (pH 5.6); iron and manganese coatings on the surfaces of peds; gradual, wavy boundary. 12 to 14 inches thick.

B3g—30 to 36 inches, gray (10YR 5/1) silt loam; common, fine, distinct, dark reddish-brown (5YR 3/4) and yellowish-brown (10YR 5/8) mottles; weak, medium, blocky structure; firm when moist, slightly sticky when wet; strongly acid (pH 5.2); clear, wavy boundary. 4 to 6 inches thick.

IIC—36 to 42 inches +, dark-brown (7.5YR 4/4) loam; common, fine and medium, prominent, gray (10YR 5/1) and yellowish-brown (10YR 5/8) mottles; massive; firm when moist; strongly acid (pH 5.1).

The texture of the B horizons ranges from silt loam to silty clay loam. Depth to hard rock ranges from 4 to 6 feet or more. Gravel and cobblestones of varying sizes and amounts are present in some areas underlain by sandstone and quartzite, though these soils are generally free of stones.

Atkins soils occur with well drained Pope soils and moderately well drained Philo soils. They were formed in the same kind of material as the Pope and Philo soils.

Atkins silt loam (Au).—This is the only soil of the Atkins series mapped in this county. It has the profile described as typical for the Atkins series. This soil is nearly level, and it is in depressions, or oxbows, back of natural levees where floodwaters are trapped. It often receives surface water that runs off the uplands, and it is frequently flooded.

Included with this soil in mapping were small areas in which the soil has a black surface layer and is wetter than typical. Also included were areas of poorly drained soils on flood plains of streams that drain areas of Chester and Brandywine soils.

Unless it is drained, this Atkins soil is too wet for crops. It can be used for permanent pasture if it is carefully managed. Where adequate outlets are available, artificial drainage increases the suitability for crops. (Capability unit IIIw-2)

Baile Series

The Baile series consists of soils that are deep and poorly drained. These soils have formed in material weathered from bedrock and in colluvium derived from granitic gneiss. They are in drainageways, depressions, and nearly level areas at the foot of slopes in the east-central and eastern parts of the county.

In a cultivated soil typical of the Baile series, the plow layer is dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil, between a depth of 8 and 20 inches, is gray silty clay loam that has a few spots and streaks of yellowish brown. The lower part, between a depth of 20 and 40 inches, is grayish-brown silty clay loam containing a few, distinct, brown mottles. The substratum extends to a depth of 60 inches or more and is gray, mottled clay loam. The spots and streaks in the upper part of the subsoil indicate that water stands in the Baile soils and makes them wet during most of the year. When disturbed, the soil material breaks to weak, prism-shaped blocks.

Runoff is slow, and permeability is slow. Though the soils are wet, outlets for drains are difficult to find. The large number of stones in many areas makes these soils difficult to manage.

Representative profile of Baile silt loam (0 to 3 percent slopes) in a pasture west of Hereford:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist; neutral (pH 6.8 where lime has been applied); abrupt, smooth boundary. 6 to 8 inches thick.

B21tg—8 to 20 inches, gray (10YR 5/1) gritty silty clay loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; moderate, very coarse, prismatic structure breaking to coarse blocky structure; firm when moist, slightly sticky and plastic when wet; thick patches of clay films on ped surfaces and lining pores; slightly acid (pH 6.2); clear, smooth boundary. 10 to 14 inches thick.

B22tg—20 to 40 inches, grayish-brown (10YR 5/2) gritty silty clay loam; few, medium, distinct, brown (7.5YR 5/4) mottles; weak, coarse, prismatic structure breaking to moderate, medium, blocky structure; firm when moist, sticky and plastic when wet; thick patches of clay films; medium acid (pH 5.6); gradual, wavy boundary. 20 to 30 inches thick.

Cg—40 to 60 inches, gray (10YR 5/1) gritty clay loam; many, coarse, distinct, yellowish-brown (10YR 5/4) mottles; weak, very coarse, prismatic structure; firm when moist, slightly sticky and slightly plastic when wet; strongly acid (pH 5.2).

The color of the Ap horizon ranges from dark grayish brown to gray. The B horizons are gleyed and contain distinct or prominent mottles of brown and yellowish brown. Texture of the B horizons ranges from clay loam to silty clay loam. Thickness of the solum ranges from 35 to 55 inches, and depth to hard rock ranges from 6 to 8 feet. Reaction in the upper part of the solum ranges from neutral to strongly acid, depending on the amount of lime that has been applied. In the lower part of the solum, it ranges from medium acid to strongly acid.

In places Baile soils occur with deep, well-drained Chester soils and with moderately deep, well-drained Brandywine soils. They are also near moderately well drained, nearly level and gently sloping Glenville soils.

Baile silt loam (Ba).—This soil is in depressions and in nearly level areas along drainageways. Its profile is the one described as typical for the Baile series.

Included with this soil in mapping were areas of soils too small to be shown on the soil map, where water stands on the surface for long periods. In these areas the vegetation is cattails and other wetland plants.

Unless this Baile soil is drained, it is too wet for crops. Therefore, most of it is in pasture (fig. 5). Grasses and legumes that tolerate excess moisture should be seeded in the pastures. Where outlets are available, drainage makes this soil easier to manage and more suitable for crops. (Capability unit Vw–1)

Baile very stony silt loam (Bd).—This soil has many stones and boulders on the surface. It is in depressions and in nearly level areas along drainageways that drain areas of Chester and Brandywine soils and a few areas of very stony, red soils.

This soil is too wet and stony to be suitable for cultivated crops, and it is mostly in trees. Adapted kinds of trees grow well in the open spots. Some areas that have already been cleared are used for pasture. (Capability unit VIIs–2)

Bedington Series

Deep, well-drained soils on upland flats and benches are in the Bedington series. These soils have formed in material weathered from neutral or slightly acid, gray and brown shale or siltstone. They have formed under a cover of oak and hickory.

In a cultivated soil typical of the Bedington series, the plow layer is dark-brown shaly silt loam about 9 inches thick. The subsoil is slightly sticky and plastic when wet. The upper part of the subsoil, extending to a depth of about 34 inches, is yellowish-brown to strong-brown shaly silt loam to shaly silty clay loam that has blocky structure. The lower part, between a depth of 34 and 40 inches, is yellowish-red shaly silty clay loam that has weak blocky structure. The substratum, which consists of yellowish-red silty clay loam between fragments of shale, is at a depth below 40 inches. About 90 percent of the substratum is fragments of shale. Soft, light olive-brown shale is at a depth of about 72 inches.

Bedington soils are easily tilled. Their available moisture capacity and natural fertility are moderate, and permeability is moderate to rapid.

Representative profile of Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field one-half mile south of Shoemakersville:

Ap—0 to 9 inches, dark-brown (10YR 3/3) shaly silt loam; 15 to 25 percent of horizon is coarse fragments; moderate, fine, granular structure; friable when moist; neutral (pH 6.6 where lime has been applied); abrupt, smooth boundary. 7 to 11 inches thick.

B1—9 to 16 inches, yellowish-brown (10YR 5/4) shaly silt loam; 30 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; slightly acid (pH 6.5); gradual, wavy boundary. 6 to 8 inches thick.

B21t—16 to 34 inches, strong-brown (7.5YR 5/6) shaly silty clay loam; 30 percent of horizon is coarse fragments; moderate, medium, subangular blocky structure modified by shale; friable when moist, slightly sticky when wet; moderately thick patches of clay films; medium acid (pH 6.0); clear, wavy boundary. 14 to 20 inches thick.

B22t—34 to 40 inches, yellowish-red (5 YR 4/8) shaly silty clay loam; 40 percent of horizon is coarse fragments; weak, very fine, blocky structure modified by shale; firm when moist, sticky and slightly plastic when

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Figure 5.—**Typical landscape where Baile soils occur. Baile silt loam is in the pasture in the foreground, Glenville soils are on the lower midslopes in the background, and Chester soils are on the upper slopes in the cultivated field in the background.**

wet; thick clay films; strongly acid (pH 5.4); clear, wavy boundary. 4 to 9 inches thick.

C—40 to 72 inches, yellowish-red (5YR 4/8) shaly silty clay loam deposited between fragments of shale; 90 percent of horizon is coarse fragments; massive; very firm when moist; thick clay films and iron and manganese coatings on shale chips; strongly acid (pH 5.2); gradual, wavy boundary. 20 to 40 inches thick.

R—72 inches +, light olive-brown (2.5Y 5/4) shale.

The color of the Ap horizon ranges from dark brown to yellowish brown, and the color of the B horizons ranges from yellowish brown through strong brown to yellowish red. Texture of the B2 horizons ranges from shaly silt loam to shaly silty clay loam. The total thickness of the B horizons ranges from 18 to 40 inches, and the thickness of the solum ranges from 36 to 50 inches. The amount of coarse fragments in the solum ranges from 20 to 50 percent, by volume. Depth to bedrock ranges from 4 to 6 feet or more.

Bedington soils are in the same general areas as those in which moderately deep, well-drained Berks; shallow Weikert; and deep, poorly drained Brinkerton soils occur (fig. 6). In some respects the Bedington soils are similar to the Laidig, but they are finer textured and less deep, lack a fragipan, and contain fewer cobblestones of quartzite and sandstone. Unlike the Comly and Brinkerton soils, the Bedington soils are free of mottling. Also, they lack the fragipan that is typical in the Brinkerton profile.

Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded (BeB2).—This soil has the profile described as typical for the series. Included with it in mapping were small areas of nearly level soils that are not eroded or that are only slightly eroded.

Permeability is moderate to rapid, and the available moisture capacity is moderate. Surface runoff is slow to medium. The hazard of further erosion is slight.

This soil is well suited to most of the crops commonly grown in the county. Past erosion, however, is a moderate limitation to use for cultivated crops. (Capability unit IIe–2)

Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded (BeC2).—The profile of this soil is somewhat shallower over bedrock than the one described as typical for the series. Surface runoff is medium to rapid. The hazard of further erosion is severe.

This soil is fairly well suited to most of the crops commonly grown in the county. Past erosion and the moderate slopes are the major limitations. A crop rotation of low intensity and practices that conserve moisture and that reduce erosion help to keep this soil productive. (Capability unit IIIe–2)

Figure 6.—**Bedington, Berks, and Brinkerton soils used for grazing. The Bedington and Berks soils are in the pasture in the foreground, and the Brinkerton soils are in the low area near the center of the picture. Blue Mountain is in the background.**

Bedington shaly silt loam, 15 to 25 percent slopes, moderately eroded (BeD2).—This soil occurs in the same general areas as moderately deep Berks soils. Its surface layer and subsoil are thinner than the ones in the profile described as typical for the series. The moderately steep slopes and past erosion are the major limitations to use for farming.

This soil is not well suited to cultivation, but crops that require cultivation can be grown occasionally if a crop rotation of very low intensity is used. (Capability unit IVe-2)

Berks Series

The Berks series consists of moderately deep, well-drained, medium-textured, shaly soils that have formed in material weathered from gray shale and siltstone. These soils are gently sloping to very hilly. They occur mainly in a broad band in the north-central part of the county, but a small acreage is in Oley Valley.

In a cultivated soil typical of the Berks series, the plow layer is dark-brown shaly silt loam about 9 inches thick. The subsoil is strong-brown shaly silt loam or very shaly silt loam that has subangular blocky structure and is about 15 inches thick. The substratum is strong brown with some yellowish red and consists of silt and clay that fill the spaces between fragments of shale. Fragments of shale make up from 70 to 90 percent of the substratum.

Berks soils are easy to work. Their available moisture capacity is low. Natural fertility is moderate to low.

Representative profile of Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded, in a hayfield in Tulpehocken Township. The site is 1 mile southwest of Rehrersburg on Route No. T672. (This is the location of profile S62 Pa-6-1 (1-5) sampled for characterization analysis, tables 10 and 11, in the section "Laboratory Determinations.") :

Ap—0 to 9 inches, dark-brown (7.5YR 3/2) shaly silt loam; 15 percent of horizon is shale fragments; weak, very fine, granular structure; friable when moist, nonsticky when wet; neutral (pH 6.8) ; abrupt, smooth boundary. 7 to 9 inches thick.

B21—9 to 18 inches, strong-brown (7.5YR 5/6) shaly heavy silt loam; 35 percent of horizon is shale fragments; weak, fine and medium, subangular blocky structure breaking to very fine subangular blocks; friable when moist, slightly sticky when wet; thin, discontinuous films of silt and clay on shale fragments; neutral (pH 6.9) ; gradual, wavy boundary. 7 to 10 inches thick.

B22—18 to 24 inches, strong-brown (7.5YR 5/6) shaly heavy silt loam; 50 percent of horizon is shale fragments; weak, fine, blocky structure modified by shale fragments; friable when moist, slightly sticky when wet; moderately thick films of silt and clay on larger surfaces of shale fragments, but discontinuous on interiors of peds; few thin iron and manganese coatings; neutral (pH 6.6); clear, wavy boundary. 3 to 8 inches thick.

C1—24 to 33 inches, strong-brown (7.5YR 5/6) shaly silt loam; 80 percent of horizon is shale fragments; weak, fine, subangular blocky structure modified by shale fragments; friable when moist; thick, discontinuous films of silt and clay, and few, thick, black iron and manganese coatings; clear, irregular boundary. 4 to 9 inches thick.

C2—33 to 38 inches, strong-brown (7.5YR 5/6) and yellowish-red (5YR 4/8) silty clay loam fillings between shale fragments; 90 percent of horizon is coarse fragments; structureless; friable when moist, slightly sticky when wet; slightly acid (pH 6.4); thick, discontinuous films of silt and clay and many iron and manganese coatings on shale fragments.

R—38 inches +, gray (7.5YR 6/1 to 5/1) shale and siltstone.

The color of the Ap horizon ranges from dark brown to dark grayish brown, and the color of the B horizons ranges from yellowish brown to strong brown. The texture of the B horizons ranges from shaly silt loam to shaly silty clay loam. The thickness of the solum ranges from 20 to 34 inches, and the content of shale in the solum varies rather widely. The thickness of the C horizon varies considerably, depending upon the resistance of the shale to weathering and upon the amounts of folding and frost churning that have taken place. Depth to bedrock ranges from 20 to 40 inches. Reaction in the solum ranges from medium acid to neutral, depending upon the amount of agricultural lime that has been applied.

Berks shaly silt loam, 0 to 3 percent slopes, moderately eroded (BkA2).—The surface layer and subsoil of this soil are generally slightly thicker than the ones in the profile described as typical for the series. In some places as much as 6 inches of the original surface layer has been lost through erosion. Tillage has mixed material from the subsoil with that in the remaining surface layer. As a result, the present plow layer has a lighter color and a finer texture than the original one.

Surface runoff is slow or very slow. Droughtiness is a hazard to crops, but there is little or no hazard of further erosion.

This soil is suited to most of the crops commonly grown in the county. Maintaining the content of organic matter, conserving moisture to overcome the effects of droughtiness, and protecting this soil from further erosion are the major management needs. This soil can be kept productive by using a crop rotation of medium intensity and practicing contour farming in the gently sloping areas. (Capability unit IIs–2)

Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded (BkB2).—This soil has a profile that is slightly thicker than the one described as typical for the series. Erosion has removed part of the original surface layer, and the present plow layer has a lighter color and a finer texture than that of an uneroded Berks soil.

Included with this soil in mapping were areas of soils that are more sandy than this soil. These included soils are on ridges in the central part of the belt occupied mainly by Berks soils.

Surface runoff is medium to slow. The hazard of further erosion is moderate.

This soil has few limitations to use for cultivated crops. Cultivated crops should be grown in a rotation of medium intensity with other crops. Protecting this soil from further erosion, and conserving moisture, are the main management requirements that will help to maintain this soil in long-term productive use. (Capability unit IIe–5)

Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded (BkC2).—This soil has the profile described as typical for the series. It has lost about one-fourth of its original surface layer through erosion. In places tillage has mixed material from the subsoil with that in the plow layer.

Included in mapping of this soil were small areas of a deeper, more sandy soil. These included areas are in the central part of the belt occupied mainly by this and by other Berks soils.

Surface runoff is medium to rapid. The hazard of further erosion is moderate.

This soil can be used for crops. Past erosion and the strong slopes, however, are limitations to that use. (Capability unit IIIe–3)

Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded (BkD2).—This soil is on the steeper parts of the landscape, where streams have cut into the uplands. Its profile is slightly thinner than the one described as typical for the series. Included with this soil in mapping were areas of slightly deeper, more sandy soils.

Surface runoff is rapid or very rapid, and further erosion is a serious hazard. This Berks soil is more droughty than the other Berks soils.

This soil is not well suited to cultivated crops, but it can be farmed if a crop rotation of very low intensity is used. Conserving moisture and protecting this soil from further erosion are needed practices. (Capability unit IVe–3)

Berks shaly silt loam, 25 to 35 percent slopes, moderately eroded (BkE2).—The profile of this soil is generally thinner than the one described as typical for the series. Also, it contains more coarse fragments.

Surface runoff is very rapid, and the hazard of further erosion is very severe. The moisture-holding capacity has been much reduced by the losses of water through runoff, the high content of shale fragments, and the bedrock near the surface.

The slopes and the past erosion are limitations to use of this soil for farming. The slopes make the operation of farm equipment hazardous. This soil is not suited to cultivated crops, but it is suitable for pasture, trees, or other uses less intensive than growing field crops. (Capability unit VIe–2)

Birdsboro Series

The Birdsboro series consists of deep, well-drained, medium-textured soils that are gently sloping. These soils are on terraces along the Schuylkill River, southeast of Reading. They have formed in alluvial sediment underlain by reddish conglomerate, sandstone, and shale. These soils contain gravel and cobblestones. The content is highest where the soils are close to the main channel of the stream.

In a cultivated soil typical of the Birdsboro series, the plow layer is dark yellowish-brown silt loam about 7 inches thick. The subsoil has blocky structure and is dark-brown to yellowish-red silt loam to a depth of 32 inches and is dark reddish brown below that depth. The substratum, between a depth of 46 and 90 inches, is dark-brown fine sandy loam underlain by dusky-red gravelly clay loam.

Surface runoff is slow or very slow, and the hazard of erosion is slight. Flooding seldom occurs. Water moves through the profile at a moderate rate, and the capacity for storing moisture for the use of plants is high.

Birdsboro soils are generally suited to the crops commonly grown in Berks County. Most of the acreage is farmed.

Representative profile of Birdsboro silt loam, 2 to 10 percent slopes, in a cultivated field southeast of Birdsboro:

Ap—0 to 7 inches, dark yellowish-brown (10YR 4/4) silt loam; weak granular structure; very friable when moist; strongly acid (pH 5.5); abrupt, wavy boundary. 6 to 8 inches thick.

B1—7 to 11 inches, dark-brown (10YR 3/3) silt loam; weak, fine, subangular blocky structure; friable when moist; strongly acid (pH 5.5); abrupt, wavy boundary. 2 to 4 inches thick.

B21t—11 to 17 inches, yellowish-red (5YR 4/6) silt loam; weak, fine, blocky and subangular blocky structure; friable when moist, slightly sticky when wet; patches of clay films are on the peds and line the pores; medium acid (pH 6.0); clear, wavy boundary. 6 to 8 inches thick.

B22t—17 to 27 inches, yellowish-red (5YR 4/6) light silty clay; weak, fine, blocky and subangular blocky structure; friable when moist, slightly sticky when wet; thick patches of clay films are on the peds and line the pores; slightly acid (pH 6.2); clear, wavy boundary. 8 to 12 inches thick.

B23t—27 to 32 inches, yellowish-red (5YR 4/6) silt loam; weak, fine, blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thick patches of clay films are on the peds and line the pores; slightly acid (pH 6.2); clear, wavy boundary. 4 to 7 inches thick.

B3—32 to 46 inches, reddish-brown (5YR 4/4) silt loam; weak, fine, blocky structure; friable when moist; slightly acid (pH 6.2); gradual, wavy boundary. 12 to 16 inches thick.

IIC1—46 to 54 inches, dark-brown (7.5YR 4/4) fine sandy loam; massive; friable when moist; medium acid (pH 5.8); abrupt, wavy boundary. 6 to 9 inches thick.

IIIC2—54 to 90 inches, dusky-red (2.5YR 3/2) gravelly clay loam; massive; friable when moist; strongly acid (pH 5.4); upper part of layer contains lenses of gravel 3 inches thick.

The content of gravel and cobblestones varies considerably. Where red sediment from the Triassic uplands has been mixed with yellowish-brown or gray material from upstream, the color of the profile varies, to some extent, from that described as typical. The underlying material ranges from dark brown or dark reddish brown to dusky red in color and from silt loam to gravelly clay loam in texture. Reaction ranges from strongly acid to slightly acid in the upper part of the profile. Just below a depth of 32 inches, the soil material is typically slightly acid, but reaction in the lower part of the profile ranges from slightly acid to strongly acid to a depth of 90 inches.

Birdsboro soils are adjacent to deep, moderately well drained Raritan soils and to deep, poorly drained Lamington soils. Unlike the Raritan soils, which are mottled below a depth of 18 inches, and also unlike the Lamington soils, which are mottled within 18 inches of the surface, the Birdsboro soils are free of mottling.

Birdsboro silt loam, 2 to 10 percent slopes (BIB).—This soil has the profile described as typical for the series. It is on terraces along the Schuylkill River. The slopes are smooth and gentle.

Runoff is slow or very slow, and the hazard of further erosion is slight. This soil is suited to most of the crops commonly grown in the county. It has few limitations and is subject to few risks if used for purposes other than farming. (Capability unit IIe-1)

Birdsboro-Duffield silt loams, 3 to 10 percent slopes (BmB).—In the central part of the county along the Schuylkill River north of Reading, gently sloping Birdsboro and Duffield soils occur in such an intricate pattern, and require such similar management, that it was not practical to map the soils separately. In those places these soils have been mapped together as a complex. Both soils generally occur in each area shown on the map. The Birdsboro soils have a profile similar to the one described for the Birdsboro series, except that the profile normally has a more orange or more yellowish color and a finer texture. The Duffield soils have a profile similar to the one described for the Duffield series, except that the surface layer is more gravelly.

Runoff is slow to medium. In some places erosion is only slight, but most areas are moderately eroded. In fact, more than 9 inches of the original surface layer has been lost from the steepest areas of these soils near the river. The hazard of further erosion is slight to moderate. These soils have high available moisture capacity. They are generally well suited to the crops commonly grown in the county. (Capability unit IIe-1)

Bowmansville Series

In the Bowmansville series are poorly drained soils that formed in alluvial sediment underlain by reddish conglomerate, sandstone, and shale. These soils are along Hay Creek and similar streams that drain the southern part of the county. They are in swales, low spots, or oxbows, where surface water and floodwaters remain for several days after heavy rains or floods. Flooding is most common in spring and fall. Each time it occurs, the water deposits fresh sediment. The profile of these soils is medium textured throughout, and the surface is free of stones.

In a cultivated soil typical of the Bowmansville series, the plow layer is reddish-brown silt loam about 9 inches thick. The upper part of the subsoil, between depths of 9 and 17 inches, is dark reddish-brown or reddish-brown, mottled silt loam that has weak subangular blocky structure. The lower part, extending to a depth of 42 inches, is gray, mottled silt loam that has angular blocky structure. The substratum, at a depth of about 42 inches, is gray, mottled fine sandy loam underlain by coarse sand and sandstone pebbles.

Most areas of Bowmansville soils are moderately fertile. These soils are so wet and so frequently flooded, however, that they are used mainly for pasture. Cultivated crops are grown, to some extent, where these soils have been drained.

Representative profile of Bowmansville silt loam in a pastured field 1 mile south of Geigertown:

Ap—0 to 9 inches, reddish-brown (2.5YR 4/4) silt loam; weak, very fine, granular structure; very friable when

moist; medium acid (pH 6.0); clear, wavy boundary. 8 to 10 inches thick.

B1—9 to 17 inches, dark reddish-brown (2.5YR 3/4) silt loam; mottles of light red (2.5YR 6/6) and weak red (2.5YR 5/2); weak, fine, subangular blocky structure; friable when moist; medium acid (pH 5.8); clear, wavy boundary. 5 to 10 inches thick.

B2g—17 to 42 inches, gray (5YR 6/1) silt loam; many, fine to coarse, distinct, yellowish-red (5YR 5/6) mottles; moderate, medium to coarse, blocky structure; firm when moist, slightly sticky and slightly plastic when wet; very strongly acid (pH 4.6); clear, wavy boundary. 22 to 42 inches thick.

IIC1g—42 to 50 inches, gray (5YR 6/1) fine sandy loam; many, fine to coarse, distinct, yellowish-red (5YR 5/6) mottles; moderate, medium, prismatic structure; firm when moist, slightly sticky when wet; very strongly acid (pH 4.5); clear, wavy boundary. 6 to 8 inches thick.

IIIC2—50 to 60 inches, coarse sand and sandstone pebbles.

Depth to mottling ranges from 0 to 10 inches; the depth is greatest where these soils grade to somewhat poorly drained soils. The color of the matrix in the IIC1g horizon ranges from weak red to gray, depending on the degree of saturation and on the color of the soils on the uplands of the watershed. In all areas the IIC1g horizon is intensively mottled. Below a depth of 30 inches, thin layers or lenses of both sandy clay and silt loam are common. Below a depth of 40 inches, many areas contain layers of sand and gravel, and in a few places they contain layers of silty clay loam or clay loam. Depth to bedrock ranges from 4 to 8 feet or more.

Bowmansville soils are the poorly drained members of the drainage sequence that includes the moderately well drained Rowland soils.

Bowmansville silt loam (Bo).—This is the only soil of the Bowmansville series mapped in Berks County. It has the profile described as typical for the series. Included in mapping were small areas of wet soils that have water ponded on the surface most of the time.

Surface runoff is slow or very slow on this nearly level Bowmansville soil. Erosion is not a hazard or is only a slight hazard.

Wetness and the frequency of flooding limit the use of this soil for farming, unless drainage is provided. Most of the acreage is in pasture, though a few areas are cultivated. Plants that tolerate wetness should be grown for pasture and for field crops. (Capability unit IIIw-2)

Brandywine Series

The Brandywine series consists of soils that are moderately deep, well drained, and gently sloping to hilly. These soils contain a large number of coarse fragments consisting of material that weathered from granitic gneiss. They are in the east-central and western parts of the county in the area known locally as the Reading Hills.

In a cultivated soil typical of the Brandywine series, the plow layer is very dark grayish-brown channery loam that is about 7 inches thick and is strongly acid in areas that have not received lime. The subsoil is yellowish-brown channery sandy loam about 11 inches thick. It is strongly acid and has subangular blocky structure. The substratum is at a depth of about 18 inches and consists of yellowish-brown, strongly acid very channery and very gravelly loam. Granitic gneiss is at a depth of 30 inches. A large number of coarse fragments are in the solum, and coarse fragments make up about 85 percent of the substratum.

The available moisture capacity is moderate to low. Permeability is moderate. Root penetration is shallow to moderately deep.

Brandywine soils are generally suited to most of the farm crops commonly grown in the county. Nevertheless, most of the acreage is in trees. Small areas are in pasture or field crops.

Representative profile of Brandywine channery loam, 8 to 15 precent slopes, moderately eroded, in a field near Hill Church:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) channery loam; 30 percent of horizon is coarse fragments; weak, fine, granular structure; very friable when moist; strongly acid (pH 5.2); abrupt, wavy boundary. 5 to 8 inches thick.

B2—7 to 18 inches, yellowish-brown (10YR 5/4) channery sandy loam; 40 percent of horizon is coarse fragments; subangular blocky structure; very friable when moist; strongly acid (pH 5.2); gradual, wavy boundary. 8 to 12 inches thick.

C—18 to 30 inches, yellowish-brown (10YR 5/6) very channery very gravelly loam; 85 percent of horizon is coarse fragments; single grain; very friable when moist; very strongly acid (pH 5.0); clear, irregular boundary. 10 to 16 inches thick.

R—30 inches +, granitic gneiss.

Texture of the B2 horizon ranges from channery sandy loam to channery loam. The content of coarse fragments ranges from 35 to 90 percent in the B2 and C horizons, and it generally increases with depth. Depth to bedrock ranges from 20 to 40 inches.

Brandywine soils occur with the deep, well drained Chester, the moderately well drained Glenville, and the poorly drained Baile soils.

Brandywine channery loam, 3 to 8 percent slopes, moderately eroded (BrB2).—This soil generally has a thicker, somewhat finer textured profile than the one described as typical for the series. It is gently sloping.

Runoff is slow to medium, and the hazard of further erosion is slight. Permeability throughout the profile is moderate, and the available moisture capacity is moderate to low.

This soil is suitable for crops. The major limitations to farm use are the limited depth to bedrock, slopes, and low available moisture capacity. (Capability unit IIe-5)

Brandwine channery loam, 8 to 15 percent slopes, moderately eroded (BrC2).—This soil has the profile described as typical for the series. Included with it in mapping were small areas of severely eroded soils.

Surface runoff is medium to rapid, and the hazard of further erosion is moderate. Permeability throughout the profile is moderate, and the available moisture capacity is moderate to low.

This soil is fairly well suited to use for crops. The major limitations to use for crops are the limited depth to bed rock, the slopes, and the low available moisture capacity. (Capability unit IIIe-3)

Brandywine channery loam, 15 to 25 percent slopes, moderately eroded (BrD2).—In most places this soil has a slightly thinner profile than the one described as typical for the series, and it is also shallower over bedrock. Included in mapping were small areas of severely eroded soils.

Surface runoff is rapid or very rapid. The available moisture capacity is generally low.

The major limitations to use for farming are the moderately steep slopes, the low available moisture capacity, and bedrock near the surface. This soil is not well suited to cultivated crops. (Capability unit IVe-3)

Brecknock Series

Deep, well-drained, gently sloping to steep soils make up the Brecknock series. These soils have formed in material weathered from shale and siltstone that were metamorphosed by heat and pressure when the adjacent diabase intrusions were formed. They have inherited their dark colors and low chroma from the very dark gray or purplish-gray colors of the baked shale. These soils contain a large number of dark-colored, platy, coarse fragments. They are in the southern part of the county.

In a cultivated soil typical of the Brecknock series, the plow layer is very dark grayish-brown, slightly acid channery silt loam about 8 inches thick. The subsoil is dark grayish-brown, friable, strongly acid channery silt loam that has subangular blocky or platy structure in the lower part and extends to a depth of about 38 inches. The substratum is yellowish-brown very channery sandy loam that is underlain by very dark gray, platy shale at a depth of about 48 inches. The solum contains a large number of coarse fragments, and coarse fragments occupy about 70 percent of the substratum.

Brecknock soils have low natural fertility. Most of the acreage is in pasture or trees, but field crops are grown in small areas. The soils under trees are generally very stony.

Representative profile of Brecknock channery silt loam, 3 to 8 percent slopes, in a cultivated field near Grill:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) channery silt loam; 20 percent of horizon is coarse fragments; very fine granular structure; friable when moist; slightly acid (pH 6.4 where lime has been applied); abrupt, smooth boundary. 6 to 8 inches thick.

B1—8 to 15 inches, dark grayish-brown (10YR 4/2) channery silt loam; 20 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; slightly acid (pH 6.2); clear, wavy boundary. 5 to 9 inches thick.

B21t—15 to 25 inches, dark grayish-brown (10YR 4/2) channery silt loam; 25 percent of horizon is coarse fragments; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; patches of clay films on peds and in pores; strongly acid (pH 5.4); clear, wavy boundary. 7 to 12 inches thick.

B22t—25 to 38 inches, dark grayish-brown (10YR 4/2) channery silt loam; 40 percent of horizon is coarse fragments; weak, medium, subangular blocky and platy structure; friable when moist, slightly sticky and plastic when wet; thin clay films on peds and in pores; strongly acid (pH 5.4); clear, wavy boundary. 9 to 15 inches thick.

C—38 to 48 inches +, yellowish-brown (10YR 5/4) very channery sandy loam; 70 percent of horizon is coarse fragments; structure obscured by coarse fragments; friable when moist; medium acid (pH 5.6).

The color of the B2t horizons ranges from very dark gray to dark grayish brown or yellowish brown. Texture of the B2t horizons ranges from silty clay loam to coarse silt loam. Thickness of the solum ranges from 24 to more than 38 inches. Reaction of the B horizons ranges from slightly acid to strongly acid. Depth to bedrock ranges from 40 to 72 inches. The amount of coarse fragments ranges from 10 percent, in the upper part of the solum, to more than 50 percent, in the lower part.

Brecknock soils are members of the drainage sequence that includes the deep, moderately well drained Lehigh soils. Adjacent to them are the deep, well-drained Neshaminy and moderately deep, well-drained Penn soils. Near the Brecknock soils, in depressions and flat areas, are the poorly drained Croton soils.

Brecknock channery silt loam, 3 to 8 percent slopes (BsB).—This soil has the profile described as typical for the series. It has a large number of coarse fragments on the surface.

Surface runoff is slow to medium, and the hazard of erosion is slight. Permeability and the available moisture capacity are moderate.

This soil is suited to cultivated crops, but coarse fragments on the surface interfere with the emergence and growth of small plants in some places. (Capability unit IIe–5)

Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded (BsC2).—This soil is steeper and has a thinner surface layer than the one for which a profile is described as typical for the series. In some places tillage has mixed material from the subsoil with that in the plow layer.

Included with this soil in mapping were small areas of soils that have lost most of their original surface layer through erosion.

Surface runoff is medium to rapid, and the hazard of further erosion is moderate. Permeability and the available moisture capacity are moderate.

This soil is suited to cultivated crops. The major limitations to use for cultivated crops are the slopes, the past erosion, and the hazard of further erosion. (Capability unit IIIe–3)

Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded (BsD3).—In most places the profile of this soil is thinner over bedrock than the one described as typical for the series. Much of the original surface layer has been lost through erosion, and the subsoil is exposed in places.

Included with this soil in mapping were small areas of soils that have a cover of trees and that are not eroded. Also included were areas in which only about half of the original surface layer has been lost.

Surface runoff is rapid or very rapid. The hazard of further erosion is high.

This soil has few limitations to use for cultivated crops. The major limitations are the moderately steep slopes and the degree of past erosion. (Capability unit VIe–2)

Brecknock very stony silt loam, 0 to 8 percent slopes (BtB).—This soil is in trees. Its surface layer, therefore, contains more organic matter than the one in the profile described as typical for the series. Also, many stones are on the surface.

Surface runoff is slow to medium, and erosion is not a hazard or is only a slight hazard. The available moisture capacity is moderate.

The large number of stones on the surface and throughout the profile is a major limitation to use of this soil for farming. Where the trees have already been cleared, however, this soil may be used for permanent pasture if good managment is feasible. Keeping this soil in trees is a suitable long-term use. (Capability unit VIs–1)

Brecknock very stony silt loam, 8 to 25 percent slopes (BtD).—The profile of this soil contains more stones than the profile described as typical for the series. The surface layer also contains more organic matter than the one in the profile described, because this soil is under forest.

Runoff is medium to rapid. The hazard of erosion is slight in areas that have not been cleared, but it is moderate to high in areas that have been cleared.

Stoniness and the strong or moderately steep slopes are the major limitations to farm use. This soil is suitable for permanent pasture, but clearing the trees and stones so that a pasture can be established is generally not economically feasible. (Capability unit VIs–1)

Brecknock very stony silt loam, 25 to 60 percent slopes (BtF).—This soil is on the sides of hills consisting of ironstone. Its profile is much thinner than the one described as typical for the series, and many stones are on the surface. Little or no soil material has been lost through erosion, because of the protective cover of trees and stones.

This soil is generally too steep for farming. The major limitations to farm use are stoniness and the steep or very steep slopes. Maintaining a cover of trees and using the areas for recreation, wildlife habitat, and protection of the watershed are suitable long-term uses. (Capability unit VIIs–1)

Brinkerton Series

In the Brinkerton series are deep, poorly drained soils formed in material that weathered from fragments of shale, siltstone, and sandstone at the bases of slopes. These soils are in depressions, drainageways, and flat areas. They are mainly in the northern half of the county and occupy a broad band that extends from northeast to southwest.

In a cultivated soil typical of the Brinkerton series, the plow layer is dark grayish-brown, mottled silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 18 inches, is grayish-brown to dark-gray, mottled silt loam that is slightly sticky and slightly plastic when wet. The lower part, between depths of 18 and about 31 inches, is grayish-brown to gray silty clay loam to very shaly clay loam. In this part of the subsoil, the content of shale increases with increasing depth and the soil material is mottled. The substratum, below a depth of 31 inches is brown to pale-brown shaly clay loam. About 80 percent of the substratum is coarse fragments.

A firm, slowly permeable layer (fragipan) in the subsoil restricts the penetration of roots and the movement of water. This fragipan is responsible, in part, for the seasonal high water table in these soils. The high water table limits the choice of crops that can be grown and limits other uses of these soils.

Most of the acreage is in pasture. A few are cultivated.

Representative profile of Brinkerton silt loam, 0 to 3 percent slopes, in a cultivated field 3 miles northwest of Virginville:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine, distinct, reddish-brown (2.5YR 4/4), brownish-yellow (10YR 6/6), and yellowish-red (5YR 4/6) mottles; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; slightly acid (pH 6.5 where lime has been applied); abrupt, smooth boundary. 6 to 8 inches thick.

B1g—7 to 14 inches, grayish-brown (10YR 5/2) heavy silt loam; many, fine, distinct, brownish-yellow (10YR 6/6) and yellowish-red (5YR 4/6) mottles; weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few thin clay films on peds; slightly acid (pH 6.5); clear, wavy boundary. 5 to 9 inches thick.

B2tg—14 to 18 inches, dark-gray (10YR 4/1) silty clay loam; many, fine, distinct, dark-brown (7.5YR 4/4) and strong-brown (7.5YR 5/6) mottles; weak, medium, blocky structure; firm when moist, slightly sticky and slightly plastic when wet; thick patches of clay films on peds; slightly acid (pH 6.5); clear, wavy boundary. 3 to 6 inches thick.

Bx1g—18 to 23 inches, grayish-brown (2.5Y 5/2) silty clay loam; 10 to 15 percent of horizon is coarse fragments; many, fine, prominent, strong-brown (7.5YR 5/8) mottles; weak, coarse, prismatic structure breaking to weak, medium, blocky and platy structure; firm when moist, slightly sticky when wet; thick clay films; neutral (pH 6.6); clear, wavy boundary. 4 to 9 inches thick.

Bx2g—23 to 31 inches, gray (10YR 5/1) very shaly clay loam; 50 percent of horizon is shale chips; many, fine, distinct, brownish-yellow (10YR 6/8) mottles; weak, coarse, prismatic structure breaking to weak, medium, blocky and platy structure; firm when moist, sticky and slightly plastic when wet; thick clay films; slightly acid (pH 6.5); clear, wavy boundary. 6 to 9 inches thick.

C—31 to 38 inches, brown (10YR 5/3) to pale-brown (10YR 6/3) shaly clay loam; 80 percent of horizon is coarse fragments; friable to firm when moist, sticky when wet; slightly acid (pH 6.5).

The color of the A horizon ranges from dark grayish brown to grayish brown. The color of the B horizons ranges from grayish brown to gray, and the texture of those horizons ranges from heavy silt loam to silty clay loam. The structure of the B horizons ranges from weak, fine and medium, subangular blocky to moderate, medium, prismatic. Reaction varies as a result of differences in liming practices used by individual farmers. Reaction is generally slightly acid to neutral, depending on the amount of lime that has been applied. The number of fragments of sandstone and shale varies.

Brinkerton soils are members of the drainage sequence that includes the moderately well drained Comly soils. They occur in areas adjacent to deep, well-drained Bedington; moderately deep, well-drained Berks; and shallow Weikert and Klinesville soils. The Brinkerton soils, like the Andover, contain a fragipan. Their fragipan is less strongly expressed, however, than that of the Andover soils, and they are finer textured than those soils.

Brinkerton silt loam, 0 to 3 percent slopes (BuA).—This soil has the profile described as typical for the series. It is in depressions and seep areas, and little or no erosion has taken place. Surface drainage is slow or very slow, and water accumulates on the surface in places. This soil contains a slowly permeable fragipan.

The high water table limits use of this soil for cultivated crops. Drainage increases suitability for crops and makes this soil easier to manage. (Capability unit IVw–1)

Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded (BuB2).—This soil has somewhat better surface drainage than Brinkerton silt loam, 0 to 3 percent slopes. Erosion is a slight hazard, but wetness is the major hazard. The slowly permeable fragipan forms a partial barrier to the movement of water and the penetration of roots.

Included with this soil in mapping were some areas of soils that have lost more than three-fourths of their original surface layer through erosion and that have material from the subsoil mixed into the plow layer. Also included were areas of strongly sloping soils.

The high water table limits use of this Brinkerton soil for cultivated crops. Drainage increases the suitability for crops and makes this soil easier to manage. (Capability unit IVw–1)

Buchanan Series

The Buchanan series consists of soils that are deep, moderately well drained, and nearly level or gently sloping. These soils have formed in material that weathered from acid sandstone and shale that has accumulated along the base of Blue Mountain. This material was moved downhill by soil creep, frost action, or mudflow.

In a cultivated soil typical of the Buchanan series, the plow layer is yellowish-brown gravelly loam about 8 inches thick. The upper part of the subsoil, extending to a depth of 26 inches, is strong-brown silt loam to clay loam that has subangular blocky or blocky structure. The lower part, which extends to a depth of 60 inches, is mainly yellowish-red clay loam that has prismatic or blocky structure. These soils contain a large number of coarse fragments.

Buchanan soils have a seasonal high water table caused by a firm, slowly permeable fragipan in the subsoil. The fragipan forms a barrier to the development of roots and the movement of water and air.

Stony areas of Buchanan soils are mainly in pasture or trees. Only small areas are in crops.

Representative profile of Buchanan gravelly loam, 3 to 8 percent slopes, in a hayfield 2 miles northeast of Rehrersburg:

Ap—0 to 8 inches, yellowish-brown (10YR 5/4) gravelly loam; 15 to 20 percent of horizon is sandstone pebbles 1 to 3 inches in diameter; weak, fine, granular and weak, thin, platy structure; friable when moist; strongly acid (pH 5.3); clear, wavy boundary. 6 to 9 inches thick.

B1—8 to 12 inches, strong-brown (7.5YR 5/8) silt loam; 10 percent of horizon is coarse fragments; weak, medium, subangular blocky structure breaking to very fine, subangular blocky structure; friable when moist; thin clay films on the large ped surfaces; strongly acid (pH 5.3); gradual, wavy boundary. 3 to 5 inches thick.

B21t—12 to 19 inches, strong-brown (7.5YR 5/6) clay loam; 10 percent of horizon is coarse fragments; few, fine, prominent, yellowish-brown (10YR 5/8) mottles; weak, fine, blocky and subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thin clay films on peds and lining pores; very strongly acid (pH 4.8); gradual, wavy boundary. 6 to 8 inches thick.

B22t—19 to 26 inches, strong-brown (7.5YR 5/6) clay loam; 10 percent of horizon is coarse fragments; common, medium, distinct, yellowish-brown (10YR 5/8) and grayish-brown (10YR 5/2) mottles; moderate, medium, blocky structure; firm when moist, sticky and slightly plastic when wet; thick patches of clay films; very strongly acid (pH 4.8); clear, wavy boundary. 6 to 8 inches thick.

Bx1—26 to 35 inches, yellowish-red (5YR 5/6 and 5YR 5/8) clay loam; 10 to 15 percent of horizon is coarse fragments; common, medium, distinct, light yellowish-brown (10YR 6/4) and grayish-brown (10YR 5/2) mottles; weak, coarse, prismatic structure breaking to moderate, medium, blocky and platy structure; very firm when moist; sticky and plastic when wet; thick clay films; very strongly acid (pH 4.8); gradual, wavy boundary. 7 to 9 inches thick.

Bx2—35 to 45 inches, yellowish-red (5YR 5/6), mixed with reddish-brown (5YR 5/4), clay loam; 10 to 15 percent of horizon is coarse fragments; common, medium, prominent, light yellowish-brown (10YR 6/4) and grayish-brown (10YR 5/2) mottles; moderate, coarse, prismatic structure, but platy structure in interiors; firm when moist, slightly sticky and slightly plastic when wet; thick clay films; very strongly acid (pH 4.8); diffuse, wavy boundary. 8 to 10 inches thick.

Bx3—45 to 60 inches +, yellowish-red (5YR 4/8) mixed with strong-brown (7.5YR 5/6) clay loam; 10 to 15 percent of horizon is coarse fragments; common, medium, prominent, brownish-yellow (10YR 6/6) and grayish-brown (10YR 5/2) mottles; weak, very coarse, prismatic structure breaking readily to coarse or moderately coarse blocky; thick clay films; strongly acid (pH 4.8).

In cultivated areas the color of the Ap horizon ranges from dark gray to yellowish brown. Where these soils are under forest, they have a thin A1 horizon that has a much darker color than the Ap horizon in cleared areas. The B horizons range from strong brown to yellowish red in color, from silt loam or silty clay loam to clay loam in texture, and from weak, fine, subangular blocky to coarse blocky, thick platy, and coarse prismatic in structure. The fragipan, below a depth of 24 to 26 inches, has weak, to moderate, coarse, prismatic structure. Depth to bedrock ranges from 4 to 30 feet or more. Reaction throughout the profile ranges from strongly acid to very strongly acid.

Buchanan soils are in the same general landscape as the poorly drained Andover and well-drained Laidig soils. They lie at the base of Blue Mountain, below Edgemont and Dekalb soils. Buchanan soils are also close to areas of Berks soils but are nearer the mountain than those soils.

Buchanan gravelly loam, 3 to 8 percent slopes (BvB).—This soil is along the edges of foot slopes of Blue Mountain in areas that have been cleared of trees and stones. Its profile is the one described as typical for the series. The subsoil contains a fairly prominent fragipan that impedes the development of roots and the movement of water. Included with this soil in mapping were areas of nearly level, uneroded soils that were too small to be mapped separately.

Surface runoff is slow to medium. A seasonal high water table limits suitability for some plants. This soil is poorly suited to such crops as alfalfa, tobacco, and winter wheat. (Capability unit IIe–4)

Buchanan very stony loam, 0 to 8 percent slopes (BwB).—This soil has stones and boulders on the surface and within the soil profile. It is along the lower slopes of Blue Mountain and is mainly in trees. The trees and the large stones have prevented extensive losses of soil material through erosion. Included in mapping were small areas of slightly steeper soils.

Surface runoff is slow to medium, and the hazard of erosion is slight. A seasonal high water table and a fragipan in the subsoil reduce the depth to which roots can penetrate. The seasonal high water table and large number of stones are the major limitations to farm use.

This soil is poorly suited to cultivated crops. Areas that have been cleared of trees may be safely used for permanent pasture. Clearing the trees and stones so that a new pasture can be established, however, is generally not economically feasible. (Capability unit VIs–1)

Burgin Series, Gray Surface Variant

In some soil series, a variant is included. A variant has many of the characteristics of the series in which it is placed, but it differs in at least one important characteristic that is indicated by its name. The acreage of a variant is of too small extent to justify establishing a new series. A new series may be designated and replace the variant, however, if sufficient acreage of this soil is later found.

The gray surface variants in Berks County are deep, poorly drained soils that have formed in material that weathered from limestone and limy shale. They are in depressions or nearly level spots at the bases of slopes within areas underlain by limestone. These soils are mainly in the limestone valley in the central part of the county, in Oley Valley, and in small areas near Morgantown.

In a cultivated soil typical of these variants, the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil, extending to a depth of about 42 inches, is grayish-brown to gray, mottled silty clay or silty clay loam. The content of shale increases markedly within a short vertical distance until firm bedrock is reached.

Surface runoff is slow or very slow. Permeability is slow, and internal drainage is poor. The available moisture capacity is high.

These gray surface variants are easy to till, but they can be tilled only within a narrow range of moisture content. A high water table and the slowly permeable subsoil that is high in content of clay limit the choice of plants that can be grown.

Most of the areas are in pasture. Small areas are cultivated or in trees.

Representative profile of Burgin silt loam, gray surface variant, in a pasture 1 mile east of Leesport:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure, friable when moist; neutral (pH 7.0 where lime has been applied); clear, wavy boundary. 6 to 9 inches thick.

B21tg—8 to 15 inches, grayish-brown (10YR 5/2) silty clay loam; many, fine, distinct, yellowish-red (5YR 4/6) mottles; weak, very fine, subangular blocky structure; friable when moist, sticky and plastic when wet; few thin clay films; neutral (pH 7.2); clear, wavy boundary. 5 to 9 inches thick.

B22tg—15 to 24 inches, gray (10YR 5/1) silty clay; many, fine to medium, distinct, yellowish-red (5YR 4/6) mottles; moderate, coarse, blocky structure; firm when moist, sticky and plastic when wet; thick clay films; neutral (pH 7.2); gradual, irregular boundary. 7 to 11 inches thick.

B23tg—24 to 42 inches +, gray (10YR 5/1) silty clay loam; many, medium to coarse, distinct, strong-brown (7.5YR 5/6) mottles; 25 percent of horizon is soft, weathered, coarse fragments; moderate, medium, blocky structure breaking to weak, medium, platy structure; firm when moist, sticky and plastic when wet; thick clay films; neutral (pH 7.2).

The color of the A horizon ranges from dark grayish brown to dark brown, and the texture of that horizon is silt loam or heavy silt loam. The color of the B horizons ranges from grayish brown to gray. Texture of the B2 horizons ranges from silt loam to silty clay. In places yellowish-red and strong-brown mottling is within only a few inches of the surface. Reaction ranges from medium acid to neutral. Depth to bedrock ranges from 3½ to 10 feet.

Variants of the Burgin series occur in the same general landscape as the moderately deep Ryder soils and the deep Duffield, Hagerstown, Fogelsville, and Washington soils. In most places they are also near the deep, moderately well drained Wiltshire soils.

Burgin silt loam, gray surface variant (By).—This soil is the only gray surface variant mapped in Berks County. It has the profile described as typical of these variants, and it occurs in small depressions and in nearly level areas. In most places little or no erosion has taken place, but a few areas of moderately eroded soils were included in the mapping.

A high water table and slow permeability of the subsoil are the major limitations to the use of this soil for farming. The high water table makes most areas unsuitable for cultivated crops. Drainage would make this soil more suitable for crops and easier to manage. (Capability unit IVw-1)

Chester Series

The Chester series consists of deep, well-drained, gently sloping to hilly soils that formed in material weathered from granitic gneiss. In many places these soils have large stones and boulders on the surface. They occur in the area known as the Reading Hills.

In a cultivated soil typical of the Chester series, the plow layer is dark-brown channery silt loam about 8 inches thick. The upper part of the subsoil, extending to a depth of 39 inches, is yellowish-red silt loam. The lower part is reddish-brown, friable loam that has thin platy structure. At a depth of about 44 inches, this loam grades to the reddish-yellow, yellowish-red, and pink fine sandy loam of the substratum, which has platy structure. These soils contain many coarse fragments and are underlain by saprolite of gritty or very coarse sandy material in many places. The content of coarse fragments increases at a depth of about 44 inches, and coarse fragments are dominant at a depth of about 80 inches.

Surface runoff is slow to very rapid, permeability throughout the profile is moderate, and the available moisture capacity is high. These soils are easily worked, but some areas are very stony.

Except for their slopes and past erosion, the Chester soils have few limitations to farm use. They are generally well suited to the crops commonly grown in the county (fig. 7).

Representative profile of Chester channery silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 2 miles northeast of Temple:

Ap—0 to 8 inches, dark-brown (7.5YR 4/2) channery silt loam; 20 percent of horizon is coarse fragments; weak, fine, granular structure; friable when moist; neutral (pH 6.8 where lime has been applied); abrupt, smooth boundary. 8 to 10 inches thick.

B1—8 to 18 inches, yellowish-red (5YR 5/6) silt loam; 10 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; neutral (pH 6.8); clear, wavy boundary. 9 to 11 inches thick.

B2t—18 to 39 inches, yellowish-red (5YR 5/8) silt loam; 10 percent of horizon is coarse fragments; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common, thin patches of clay films on ped surfaces and lining the pores; few manganese and iron coatings; neutral (pH 6.6); clear, wavy boundary. 14 to 21 inches thick.

B3—39 to 44 inches, reddish-brown (5YR 4/4), mixed with light reddish-brown (5YR 6/4) loam; strong, thin, platy structure; friable when moist, slightly sticky when wet; few remains of weathered gneiss; medium acid (pH 6.0); clear, wavy boundary. 3 to 6 inches thick.

C—44 to 78 inches +, reddish-yellow (5YR 6/6), mixed with yellowish-red (5YR 5/8) and pink (7.5YR 7/4), fine sandy loam; weak, medium, platy structure; friable when moist; many manganese and iron films on ped surfaces; many fragments and large gneiss stones as much as 18 inches in diameter; slightly acid (pH 6.4).

Figure 7.—**Typical farmstead in an area of Chester channery silt loam near Fritztown. A hay crop and corn have been planted in alternate strips in the field in the foreground.**

The color of the A horizon ranges from dark brown to strong brown or reddish brown. Structure of the B2t horizon ranges from weak, fine, subangular blocky to weak, medium, platy or moderate, medium, subangular blocky. Reaction ranges from slightly to medium acid, where this soil has not received lime, to neutral, where lime has been applied. The very stony Chester soils have scattered stones and boulders on the surface.

Chester soils occur with well drained, moderately deep Brandywine; deep, moderately well drained Glenville; and deep, poorly drained Baile soils. Adjacent to them are areas of deep, well-drained Murrill and Edgemont soils.

Chester channery silt loam, 3 to 8 percent slopes, moderately eroded (ChB2).—This soil has the profile described as typical for the series. It has lost about half of its original surface layer through erosion. Plowing has mixed the remaining surface soil with material from the subsoil. As a result, the present plow layer has a finer texture and a lighter color than the original one. Included in mapping were some small areas of nearly level soils that are not eroded and that have a thicker profile than typical.

This Chester soil is mellow and is easily worked. Surface runoff is slow to medium, and the hazard of further erosion is slight. Permeability throughout the profile is moderate, and the available moisture capacity is high.

Slope is the major limitation to use of this soil for farming. Cultivated crops can be grown, but a rotation of medium intensity is needed to provide protection from erosion. Also, practices are needed that control surface runoff. (Capacity unit IIe–2)

Chester channery silt loam, 8 to 15 percent slopes, moderately eroded (ChC2).—This soil is more sloping than the soil for which a profile is described as typical for the series, and erosion has removed more of its surface layer. Material from the subsoil has been mixed with the plow layer in tillage. Included in mapping were small areas of soils that are not eroded, because they have been protected.

This Chester soil is easily tilled. Surface runoff is medium to rapid, and the hazard of further erosion is moderate. Limitations to use for farming are few, except for the slope and past erosion. (Capability unit IIIe–2)

Chester channery silt loam, 8 to 15 percent slopes, severely eroded (ChC3).—This soil is in areas where it receives concentrated surface runoff. It is steeper than the soil for which a profile is described as typical for the series, and it has lost more than three-fourths of its original surface layer through erosion. The plow layer now consists mainly of material from the subsoil that has been mixed with the remaining surface soil in tillage. It has a lighter color than the original one. The depth of this soil has been somewhat reduced as a result of losses caused by erosion.

This soil is not well suited to cultivated crops. The slopes and past severe erosion are the main limitations to farm use. (Capability unit IVe–2)

Chester channery silt loam, 15 to 25 percent slopes, moderately eroded (ChD2).—This soil is steeper than the one for which a profile is described as typical for the series, and its profile is thinner than the one described. Also, rock crops out in many places. Included in mapping were small areas of soils that are not eroded or that are only slightly eroded.

Surface runoff is rapid or very rapid, and this soil is highly susceptible to further erosion. The available moisture capacity is lower than that of more nearly level Chester soils.

The major risk in using this soil for farming is past erosion and the hazard of further erosion. This soil is not well suited to cultivated crops. (Capability unit IVe–2)

Chester channery silt loam, 15 to 30 percent slopes, severely eroded (ChE3).—This soil is steeper than the one for which a profile is described as typical for the series, and it has lost most of its original surface layer through erosion. In addition, the profile is generally thinner than the one described as typical and outcrops of bedrock are more numerous. The present plow layer consists mainly of material from the subsoil that has been mixed with the remaining surface soil by tillage.

Surface runoff is rapid or very rapid. This soil is highly susceptible to further erosion.

This soil is suitable for permanent pasture if it is carefully seeded and properly managed. The moderately steep slopes and damage from past erosion are limitations to use for cultivated crops. (Capability unit VIe–1)

Chester very stony silt loam, 0 to 8 percent slopes (CnB).—This soil has many stones and boulders on the surface and within the profile. The surface is covered with a thin, dark layer of organic matter because most areas of this soil are in trees and little or no erosion has taken place. A few areas have been cleared and are used for pasture.

Clearing this stony soil for pasture or farm crops is not economically feasible. Pasture is the most intensive use for which this soil is suited. Wooded areas should be allowed to remain in trees. (Capability unit VIs–1)

Chester very stony silt loam, 8 to 25 percent slopes (CnD).—This soil is steeper than the one for which a profile is described as typical for the series. In addition, it has many stones and boulders on the surface and within the profile. Most areas are in trees, and the surface layer in those areas is thin and dark.

Surface runoff is medium to rapid. The hazard of erosion is serious in areas where the trees have been removed.

Though most of the acreage is wooded, the small areas that have been cleared are used for permanent pasture. (Capability unit VIs–1)

Chester very stony silt loam, 25 to 55 percent slopes (CnF).—This soil has many stones and boulders on the surface and within the profile. Practically all of the acreage is in trees. The surface layer in areas under forest is dark and is stained with organic matter. Surface runoff is rapid.

This soil is too steep and too stony to be used for field crops or pasture. It should remain in forest. It is suited to recreation, wildlife habitat, and protection of the watershed. (Capability unit VIIs–1)

Comly Series

Deep, moderately well drained, nearly level and gently sloping soils make up the Comly series. These soils have formed in material that weathered from gray and brown shale. They are on broad flats, in depressions, and along seep lines in the northern and northwestern parts of the county. The areas in which they occur are underlain by shale.

In a cultivated soil typical of the Comly series, the plow layer is dark-brown silt loam about 9 inches thick. The upper part of the subsoil, extending to a depth of 18 inches, is yellowish-brown shaly silt loam that has weak blocky structure. The lower part is yellowish-brown, mottled shaly silt loam that becomes firmer in consistence and more platy in structure at increasing depths. The substratum is mainly soft, partly weathered, brown shale that has silt and clay between the fragments of shale. About 75 percent of the substratum is coarse fragments.

The Comly soils have a fragipan that slows the movement of water and impedes the penetration of roots. The fragipan helps to maintain a seasonal high water table within the soil during spring and fall. Surface runoff is slow to medium, and the hazard of erosion is slight.

Most areas of these soils are in pasture, but some are cultivated. The slowly permeable fragipan and seasonal wetness limit the choice of plants that can be grown. These soils are not well suited to plants that are sensitive to wetness caused by the high water table, but they may be cultivated.

Representative profile of Comly silt loam, 0 to 3 percent slopes, in a cultivated field one-fourth mile east of Shoemakersville:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; 15 percent of horizon is shale chips; weak, fine, granular structure; friable when moist; neutral (pH 6.6 where lime has been applied); abrupt, smooth boundary. 8 to 9 inches thick.

B1—9 to 18 inches, yellowish-brown (10YR 5/4) shaly silt loam; 15 to 20 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; medium acid (pH 5.6); gradual, wavy boundary. 6 to 12 inches thick.

B2t—18 to 27 inches, yellowish-brown (10YR 5/4) shaly silt loam; 15 to 20 percent of horizon is coarse fragments; common, fine, distinct, light brownish-gray (2.5Y 6/2) and strong-brown (7.5YR 5/6) mottles; moderate, medium, blocky structure; firm when moist, sticky and slightly plastic when wet; common patches of clay films on ped surfaces and lining pores; medium acid (pH 5.6); clear, wavy boundary. 6 to 12 inches thick.

Bx—27 to 41 inches, yellowish-brown (10YR 5/6) shaly silt loam; 35 percent of horizon is coarse fragments; common, medium, distinct, pale-olive (5Y 6/4) and light brownish-gray (2.5Y 6/2) mottles; weak, coarse, prismatic structure breaking to platy and blocky structure; firm when moist, slightly sticky and slightly plastic when wet; common clay films on the surfaces of peds and lining pores; medium acid (pH 5.8); gradual, irregular boundary. 10 to 20 inches thick.

C—41 to 50 inches +, brown (10YR 5/3) frost-churned fragments of shale, with silt and clay fillings between the fragments.

The color of the Ap horizon ranges from dark grayish brown or dark brown to olive brown. Depth to mottling ranges from 18 to 36 inches. The B horizons dominantly have a hue of 10YR, but the hue ranges from 7.5YR to 2.5Y. The texture of the B horizons ranges from silt loam to silty clay loam. The content

of coarse fragments in the solum ranges from 10 to 40 percent and increases with depth. Depth to hard shale ranges from 3 to 8 feet.

Comly soils occur with the poorly drained Brinkerton; the deep, well-drained Bedington; the moderately deep, well-drained Berks; and the shallow, well-drained Weikert soils.

Comly silt loam, 0 to 3 percent slopes (CoA).—This soil is on broad flats and in small depressions. It has the profile described as typical for the series.

Surface runoff is slow or very slow, and there is little or no hazard of erosion. The slowly permeable fragipan and a seasonal high water table make this soil unsuitable for some plants, and they also limit the kinds of management practices that can be used. Drainage would make this soil easier to manage and more suitable for crops. (Capability unit IIw-1)

Comly silt loam, 3 to 8 percent slopes, moderately eroded (CoB2).—This soil is similar to the one for which a profile is described as typical for the series, except that it is gently sloping and has lost part of its original surface layer through erosion. Surface runoff is slow.

The slowly permeable fragipan and a seasonal high water table limit the kinds of plants that can be grown and also limit the kind of management practices that can be used. The hazard of further erosion is slight if this soil is properly managed. This soil is suited to general farming, but a system for disposing of excess water is needed. (Capability unit IIe-4)

Croton Series

The Croton series consists of soils that are deep and poorly drained. These soils have formed in material weathered from bedrock and in local colluvium derived from weathered red shale, sandstone, and conglomerate. They are in depressions, in nearly level areas, and in drainageways in the southern part of the county.

In a cultivated soil typical of the Croton series, the plow layer is dark reddish-brown silt loam about 8 inches thick. The upper part of the subsoil, extending to a depth of about 30 inches, is light brownish-gray, mottled, firm silt loam to silty clay loam. The lower part, between a depth of 30 and 40 inches, is a fragipan of weak-red, mottled, firm or very firm silt loam that has prismatic structure. At a depth of about 40 inches, the material in the subsoil grades to soft, red rock.

The well-developed fragipan in the subsoil of the Croton soils impedes the penetration of roots and slows the movement of water through the profile. The water table is high.

About half of the acreage of Croton soils is in trees. The rest generally is cultivated, though most of the steep areas are idle.

Representative profile of Croton silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile west of Geigertown:

Ap—0 to 8 inches, dark reddish-brown (5YR 3/4) silt loam, moderate, medium, granular structure; friable when moist, slightly sticky when wet; neutral (pH 6.8 where lime has been applied); abrupt, wavy boundary. 6 to 8 inches thick.

B1g—8 to 15 inches, light brownish-gray (10YR 6/2) silt loam; common, fine, distinct, yellowish-red (5YR 5/6 and 4/6) mottles; weak, coarse, prismatic structure readily breaking to moderate, coarse, blocky structure; firm when moist, slightly sticky and plastic when wet; patches of clay films; neutral (pH 6.8); clear, wavy boundary. 5 to 9 inches thick.

B21tg—15 to 24 inches, light brownish-gray (10YR 6/2) silty clay loam; many, fine, distinct, yellowish-red (5YR 5/8 and 4/8) and grayish-brown (10YR 5/2) mottles; weak, coarse, prismatic structure breaking to moderate to strong, coarse, blocky structure; firm when moist, sticky and plastic when wet; silt flows and clay films on the larger surfaces; neutral (pH 6.6); gradual, wavy boundary. 7 to 12 inches thick.

B22tg—24 to 30 inches, light brownish-gray (10YR 6/2) silty clay loam; many, fine, prominent, strong-brown (7.5YR 5/8), red (2.5YR 4/8), and brown (7.5YR 5/2) mottles; moderate, coarse, prismatic structure breaking readily to moderate, coarse, blocky structure; firm when moist, sticky and plastic when wet; silt and clay films are thick on the larger surfaces; strongly acid (pH 5.4); clear, wavy boundary. 4 to 10 inches thick.

Bx1—30 to 34 inches, weak-red (2.5YR 4/2) silt loam; few, prominent, gray (10YR 5/1) and yellowish-red (5YR 5/8) mottles; moderate, very coarse, prismatic structure, but interiors of peds have moderate to strong, medium, platy structure; when moist, very firm in place but friable if displaced; when wet, slightly sticky and slightly plastic; silt and clay films on the larger surfaces; strongly acid (pH 5.2); clear, wavy boundary. 3 to 8 inches thick.

Bx2—34 to 40 inches +, weak-red (2.5YR 4/2) loam; few, fine, prominent, yellowish-red (5YR 5/8), strong-brown (7.5YR 5/6), light brownish-gray (10YR 6/2), and weak-red (10R 5/2) mottles; weak, very coarse, prismatic structure breaking to weak, coarse, blocky and weak, thick, platy structure; firm when moist, slightly sticky and nonplastic when wet; thick silt and clay films on the larger surfaces; strongly acid (pH 5.4).

Color of the Ap horizon ranges from dark grayish brown to dark reddish brown. Color of the B horizons ranges from light brownish gray or gray to weak red. The texture of the subsoil ranges from silty clay loam to gravelly loam. The structure of the subsoil ranges from weak, medium, subangular blocky to coarse blocky and coarse prismatic. Reaction of the surface layer ranges from strongly acid in areas that have not received lime, to neutral, in areas where a large amount of lime has been applied. The reaction of the subsoil ranges from neutral to very strongly acid. The content of coarse fragments ranges from only a few fragments to as much as 50 percent in the C horizon. Depth to bedrock ranges from 3 to 6 feet.

The Croton series is a member of the topographic sequence that includes the moderately well drained, deep, Readington; the well drained, moderately deep Penn; the well drained, shallow Klinesville; and the deep, well drained, sandy Lewisberry soils.

Croton silt loam, 0 to 3 percent slopes (CrA).—This soil is similar to the one for which a profile is described as typical for the series, except that it is nearly level and is not eroded or is only slightly eroded. Included with it in mapping were small areas that are ponded most of the time.

Surface runoff is slow or very slow, and erosion is not a hazard or is only a slight hazard. The well-developed, slowly permeable fragipan in the subsoil helps to maintain a seasonal high water table.

Wetness severely limits the kinds of crops that can be grown to those that can tolerate excess moisture. This soil is suited to crops of this type. Drainage is needed to remove the excess water on or in the soil and to make this soil easier to manage. (Capability unit IVw-1)

Croton silt loam, 3 to 8 percent slopes, moderately eroded (CrB2).—This gently sloping soil has the profile

described as typical for the series. It receives a great deal of surface water or lies below seep lines. Included with this soil in mapping were some areas where little or no erosion has taken place, and other areas of soils that are steeper and that have a shallower profile than this soil.

Surface runoff is slow to medium, and the hazard of further erosion is slight. A high water table and the slowly permeable fragipan are the major limitations to farm use. This soil is not well suited to cultivated crops. (Capability unit IVw-1)

Dekalb Series

The Dekalb series consists of moderately deep, well-drained, loamy soils that have formed in material weathered from gray sandstone, quartzite, and conglomerate. These soils are gently sloping to steep. They are on the sides of Blue Mountain and on the higher ridges in the Reading Hills.

In a wooded soil typical of the Dekalb series, a mat of black organic matter about 1 inch thick covers the surface. The organic matter is underlain by a layer of dark-brown very stony sandy loam, also about 1 inch thick. Beneath this thin surface layer is a layer of yellowish-brown very stony sandy loam about 11 inches thick. The subsoil extends to a depth of about 30 inches and consists of yellowish-brown or light yellowish-brown channery sandy loam or very channery sandy loam that has subangular blocky structure. The substratum is pale-brown to light-gray very stony sandy loam. The solum contains many coarse fragments, and a large part of the substratum is fragments of sandstone and quartzite. Sandstone is at a depth of about 38 inches.

Dekalb soils have moderate to low available moisture capacity and low natural fertility. Most of the areas are stony.

Practically all of the acreage is in trees, and only small areas have been cleared and are farmed. In general, these soils are suitable mainly for trees or pasture. Pastures may be seeded in areas where the trees have been removed. In general, however, clearing the trees and removing the stones so that a new pasture can be established is not economically feasible.

Representative profile of Dekalb very stony sandy loam, 0 to 8 percent slopes, in a wooded area 2 miles north of Strausstown on Blue Mountain:

O2—1 inch to 0, black (10YR 2/1) organic mat; strongly acid (pH 5.4); abrupt, wavy boundary. ¼ inch to 1 inch thick.

A1—0 to 1 inch, dark-brown (10YR 3/3) very stony sandy loam; 30 percent of horizon is coarse fragments; weak, fine, granular structure; friable when moist; very strongly acid (pH 4.5); abrupt, smooth boundary. ½ inch to 2 inches thick.

A2—1 to 12 inches, yellowish-brown (10YR 5/8) very stony sandy loam; 40 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; very strongly acid (pH 4.5); clear, wavy boundary. 9 to 12 inches thick.

B21—12 to 20 inches, yellowish-brown (10YR 5/6) and light yellowish-brown (10YR 6/4) channery sandy loam; 40 percent of horizon is sandstone fragments; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; very strongly acid (pH 4.7); clear, wavy boundary. 6 to 12 inches thick.

B22—20 to 30 inches, light yellowish-brown (10YR 6/4) very channery sandy loam; 70 percent of horizon is coarse fragments; weak, medium, subangular blocky structure; very friable when moist; very strongly acid (pH 4.7); some clay bridging; clear, wavy boundary. 6 to 11 inches thick.

C—30 to 38 inches, pale-brown (10YR 6/3) and light-gray (10YR 7/1) very stony sandy loam; massive; 90 percent of horizon is sandstone and quartzite fragments.

R—38 inches +, sandstone.

The texture of the B horizon ranges from channery sandy loam to loam. The thickness of the solum ranges from 20 to 35 inches. Reaction ranges from very strongly acid to extremely acid. The content of coarse fragments ranges from 30 percent, in the A1 horizon, to 90 percent, in the C horizon. Depth to bedrock ranges from 2 to 3½ feet.

Dekalb soils occur with deep, well drained Laidig; deep, moderately well drained Buchanan; and deep, poorly drained Andover soils. They also are near areas of Rubble land.

The Dekalb soils are not mapped separately in Berks County but are mapped in undifferentiated units with the Edgemont soils. They could have been mapped separately, for the Dekalb soils can be recognized within the mapped areas of the undifferentiated unit. The use and management of these very stony Dekalb and Edgemont soils were so similar, however, that it was not practical to separate the soils on the map.

Duffield Series

The Duffield series consists of deep, well-drained, nearly level to steep soils formed in material weathered from impure limestone. These soils are in the valley that extends from Womelsdorf, in the western part of the county, to Kutztown, in the eastern part. They are also in Oley Valley.

In a cultivated soil typical of the Duffield series, the plow layer is dark-brown silt loam about 8 inches thick. The upper part of the subsoil, extending to a depth of about 41 inches, is strong-brown silt loam to silty clay loam. The lower part is yellowish-brown silty clay loam to a depth of about 52 inches. Hard, gray limestone is generally at a depth of 52 inches.

Natural fertility and the available moisture capacity are high. Where little erosion has taken place, the surface layer is mellow and this soil is easily worked.

The main limitations of the Duffield soils are sinkholes and caverns. Where these occur, the areas around the sinkhole or cavern are subject to collapse or subsidence. In areas where the slopes are not too steep, and where erosion is only moderate or slight, these soils are well suited to crops. Most of the acreage has been cleared and is farmed intensively.

Representative profile of Duffield silt loam, 0 to 3 percent slopes, in a cultivated field one-half mile south of Tuckerton:

Ap—0 to 8 inches, dark-brown (7.5YR 4/2) silt loam; weak, fine, granular structure; friable when moist; neutral (pH 7.0 where lime has been applied); abrupt, smooth boundary. 7 to 10 inches thick.

B1—8 to 16 inches, strong-brown (7.5YR 5/6) silt loam; weak, fine, subangular blocky structure; friable when moist; neutral (pH 6.8); clear, wavy boundary. 6 to 8 inches thick.

B21t—16 to 28 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, medium to fine, blocky structure; firm when moist, slightly sticky and slightly plastic when wet; thick, discontinuous clay films on ped surfaces; few fragments of weathered limestone; neutral (pH 6.8); gradual, wavy boundary.

B22t—28 to 41 inches, strong-brown (7.5YR 5/8) silty clay loam; thick platy and moderate, fine, subangular blocky or blocky structure; firm when moist, slightly sticky and plastic when wet; thick patches of clay films on the peds and lining pores; neutral (pH 6.8); gradual, irregular boundary. 10 to 14 inches thick.

B23t—41 to 52 inches +, yellowish-brown (10YR 5/8) silty clay loam; moderate, coarse, blocky and subangular blocky structure; friable to firm when moist, slightly sticky and slightly plastic when wet; thick clay films; thin iron and manganese coatings; neutral (pH 6.7).

The color of the B horizons ranges from yellowish brown to strong brown. In general, the structure of those horizons ranges from weak, fine, subangular blocky to moderate, coarse, blocky, but it includes some thick platy structure in the B22t horizon. In most areas bedrock is at some depth between 3½ and 8 feet, but it is at a greater depth in places. Reaction ranges from medium acid to neutral in the lower part of the solum. The B horizons contain varying amounts of vein quartz and limestone fragments. In most areas, however, these soils are devoid of stone fragments.

The Duffield series is a member of the topographic and drainage sequence of soils that includes the moderately well drained Wiltshire and the poorly drained Burgin soils. These soils are near areas of deep, well-drained Washington, Fogelsville, and Hagerstown soils, and are also near areas of moderately deep Ryder and deep, well-drained Murrill soils.

Duffield silt loam, 0 to 3 percent slopes (DfA).—This soil has a thicker surface layer and subsoil than those in the profile described as typical for the series. Included with it in mapping were small areas of Wiltshire soils that are too small to be mapped separately.

Little or no water runs off this nearly level Duffield soil. The hazard of erosion is slight.

This is one of the best soils for farming in Berks County. The main limitations to some uses are the possibility of subsidence around sinkholes and the possibility that the ground water will be contaminated by drainage into these areas. (Capability unit I–1)

Duffield silt loam, 3 to 8 percent slopes, moderately eroded (DfB2).—This soil has the profile described as typical for the series. Erosion has removed enough of the surface layer that some material from the subsoil has been mixed into the plow layer. Included with this soil in mapping were small areas of soils that have lost practically all of their subsoil through erosion.

Surface runoff is slow to medium, and the hazard of further erosion is slight. Natural fertility and the available moisture capacity are high.

This soil is suited to the general farm crops grown in the county, and it is suitable for many nonfarm uses. The major limitations are the past erosion, risk of further erosion, hazards caused by the sinkholes, and the possibility that the ground water will be contaminated by drainage into these areas. (Capability unit IIe–1)

Duffield silt loam, 8 to 15 percent slopes, moderately eroded (DfC2).—This soil is steeper than the one for which a profile is described as typical for the series, and it generally contains a greater number of rock ledges. The profile is slightly thinner than the one described as typical. Erosion has removed about half of the original surface layer, and some material from the subsoil has been mixed into the plow layer. The present surface layer is finer textured and somewhat lighter colored than the original one.

Surface runoff is medium to rapid, and the hazard of further erosion is moderate. Natural fertility and the available moisture capacity are high. This soil is suited to the general farm crops grown in the county, and it is suitable for many nonfarm uses. The major limitations are the hazard of erosion, hazards caused by the sinkholes, and the possibility that the ground water will be contaminated by drainage into these areas. (Capability unit IIIe–1)

Duffield silt loam, 15 to 25 percent slopes, moderately eroded (DfD2).—This soil is along the larger streams in the county. It has steeper slopes than the soil for which a profile is described as typical for the series, and it has a thinner surface layer. Also, bedrock is nearer the surface and rock ledges are generally more numerous.

Runoff is rapid or very rapid. This soil is highly susceptible to further erosion. (Capability unit IVe–1)

Duffield and Hagerstown soils, 8 to 15 percent slopes, severely eroded (DhC3).—In some places use and management of the Duffield and Hagerstown soils are so similar that it was not practical to separate these soils on the soil map. Therefore, the soils were mapped together as an undifferentiated unit. Some areas contain only one of these soils, and others contain both.

These soils generally have short slopes. They have lost more than three-fourths of their original surface layer through erosion. The present plow layer consists of moderately fine textured material from the subsoil that has been mixed with organic matter and with the remaining surface soil. It is finer textured, has a more reddish color, and is more difficult to till than the original plow layer. Bedrock is generally nearer the surface than in the profiles described as typical for the Duffield and Hagerstown series.

Past erosion has increased the hazard of further erosion on these sloping soils. Surface runoff is medium to rapid, and the hazard of further erosion is moderate. These soils can be used for farming. (Capability unit IVe–1)

Duffield and Hagerstown soils, 15 to 30 percent slopes, severely eroded (DhE3).—These moderately steep soils have lost more than three-fourths of their original surface layer through erosion. The present plow layer consists of material from the subsoil that has been mixed with organic matter and with the remaining surface soil. Bedrock is generally nearer the surface than in the profiles described as typical for the Duffield and Hagerstown series.

The slopes are generally short, and surface runoff is rapid or very rapid. These soils are highly susceptible to further erosion.

These soils are too steep for cultivation but are used for pasture in many places. (Capability unit VIe–1)

Edgemont Series

Deep, well-drained, gently sloping to steep soils make up the Edgemont series. These soils have formed in material weathered from hard sandstone, quartzite, granitic gneiss, and other igneous or metamorphic rocks. They are on ridges and side slopes of Blue Mountain in the northern part of the county and on South Mountain and on ridges of the Reading Hills in the southwestern part.

In a wooded soil typical of the Edgemont series, a thin layer of leaves overlies a very dark gray mat of organic

matter that, in turn, overlies a layer of black channery coarse sandy loam. Each of these layers is about an inch thick. The main part of the surface layer is light yellowish-brown channery sandy loam that contains many fragments of quartzite and is about 8 inches thick. The subsoil, between a depth of 8 and about 36 inches, is light yellowish-brown channery sandy loam to loam. It has subangular blocky or blocky structure and contains many coarse fragments. The substratum, below a depth of about 36 inches, is light yellowish-brown sandy loam, and it also contains many coarse fragments. Hard quartzite is at a depth of about 50 inches. Reaction throughout the profile is generally very strongly acid in areas that have not been limed.

The available moisture capacity is moderate to low, and permeability is moderate to rapid. Natural fertility is low.

Most areas of these soils are in trees. Some small areas are in crops or pasture.

Profile of Edgemont very stony sandy loam, 8 to 25 percent slopes, in a wooded area in Ruscombmanor Township, 1¼ miles southeast of Breezy Corner on the north side of Route T569. (This is the location of Profile S62 Pa-6-6 (0-7) sampled for laboratory characterization analysis, tables 10 and 11 in the section "Laboratory Determinations."):

O1—1, to ½ inch, leaf litter that is mostly oak leaves; abrupt, wavy boundary. ¼ inch to 1 inch thick.

O2—½ inch to 0, very dark gray (5YR 3/1) organic matter; abrupt, wavy boundary. ¼ inch to 1 inch thick.

A1—0 to 1 inch, black (10YR 2/1) channery coarse sandy loam, with patches of gray (10YR 5/1); 40 percent of horizon is coarse fragments; weak, fine, granular structure; very friable when moist, nonsticky when wet; extremely acid (pH 4.3); abrupt, wavy boundary ½ inch to 1½ inches thick.

A2—1 to 8 inches, light yellowish-brown (10YR 6/4) channery sandy loam; 40 percent of horizon is quartzite fragments; weak, fine, subangular blocky structure; friable when moist, nonsticky when wet; very strongly acid (pH 5.0); clear, irregular boundary. 5 to 9 inches thick.

B1—8 to 12 inches, light yellowish-brown (10YR 6/4) channery sandy loam; 25 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist, nonsticky when wet; few thin clay films; very strongly acid (pH 4.9); clear, wavy boundary. 3 to 7 inches thick.

B21t—12 to 24 inches, light yellowish-brown (10YR 6/4) channery sandy loam; 20 percent of horizon is coarse fragments; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common thin clay films on ped surfaces; very strongly acid (pH 4.8); clear, wavy boundary. 9 to 15 inches thick.

B22t—24 to 36 inches, light yellowish-brown (10YR 6/4) channery loam; 30 percent of horizon is coarse fragments; weak, medium, blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common thin clay films on peds and lining pores; very strongly acid (pH 4.8); gradual, irregular boundary. 10 to 16 inches thick.

C—36 to 50 inches +, light yellowish-brown (10YR 6/4) sandy loam; 25 percent of horizon is coarse fragments; thin platy structure tending to be massive; very friable when moist, nonsticky when wet; very strongly acid (pH 4.7).

The texture of the surface layer ranges from very stony sandy loam to channery loam. The areas in which the surface layer is very stony sandy loam are predominant and are in trees. Places where the surface layer is channery loam are adjacent to stony areas and consist of soils that have been cleared of stones. The texture of the B horizons ranges from clay loam to sandy loam, and the color of those horizons ranges from strong brown to light yellowish brown. Reaction in the B horizons ranges from strongly acid to very strongly acid. The solum ranges from 24 inches to more than 55 inches in thickness, and the content of coarse fragments in the solum ranges from 10 to 40 percent. Depth to hard rock ranges from 3½ to 7 feet.

Edgemont soils occur with Dekalb, Laidig, Buchanan, and Andover soils on Blue Mountain. They occur with Chester, Brandywine, Glenville, and Baile soils on South Mountain and the Reading Hills.

Edgemont channery loam, 3 to 8 percent slopes, moderately eroded (EcB2).—This soil is in the vicinity of South Mountain and the Reading Hills. It is slightly deeper than the soil for which a profile is described as typical for the series, and it has been cleared of stones and used for crops. Plowing has mixed the organic layers with the mineral material in the surface layer. Small areas of nearly level soils and of severely eroded soils were included with this soil in mapping.

Runoff is slow to medium, and the hazard of further erosion is slight. This soil holds more moisture available to plants than do the steeper and stonier soils. Slopes and past erosion are the limitations to use for crops. (Capability unit IIe-2)

Edgemont channery loam, 8 to 15 percent slopes, moderately eroded (EcC2).—This soil is near South Mountain and the Reading Hills. In places it is slightly deeper than the soil for which a profile is described as typical for the series, and it has been cleared of stones and used for crops. Plowing has mixed the organic layers with the mineral material in the surface layer. Small areas of severely eroded soils were included with this soil in mapping.

Runoff is medium on this Edgemont soil. The hazard of further erosion is moderate if this soil is cultivated.

Slopes and the hazard of further erosion are the limitations to farm use. (Capability unit IIIe-2)

Edgemont channery loam, 15 to 25 percent slopes, moderately eroded (EcD2).—The profile of this soil is less stony than the one described as typical for the series. This soil has been cleared for cultivation, and the stones have been removed from most areas. The dark organic matter and leaf litter have been mixed into the surface layer when this soil was plowed.

Strong slopes, damage from past erosion, and the susceptibility to further erosion limit this soil to nonintensive farm use. (Capability unit IVe-2)

Edgemont and Dekalb very stony sandy loams, 0 to 8 percent slopes (EdB).—In some places the management and use of the Edgemont and Dekalb soils are so similar that separating these soils on the soil map was impractical. Therefore, these soils were mapped together as an undifferentiated unit. Some areas contain only one of these soils, and others contain both. The soils are mainly at the bases of slopes, on benches, or on the tops of ridges. They are not eroded to any extent, because they have been protected by a cover of trees

The available moisture capacity is moderate to low. Natural fertility is low.

These soils are so stony that they are not suitable for cultivation. Where they have been cleared, the soils are suitable for pasture. Clearing of trees and removal of

stones to establish a new pasture, however, is generally not considered economically feasible. (Capability unit VIs-1)

Edgemont and Dekalb very stony sandy loams, 8 to 25 percent slopes (EdD).—This mapping unit consists of sloping to moderately steep Edgemont and Dekalb very stony sandy loams that were mapped together because their use and management were too similar for them to be mapped separately. The soil of each series can be readily recognized.

These soils are mainly on the side slopes of Blue Mountain and on ridges of South Mountain and the Reading Hills. They are generally somewhat shallower over bedrock than the less sloping Edgemont and Dekalb soils, and outcrops of bedrock are more numerous. Only slight erosion has taken place because the forest cover has protected these soils.

The available moisture capacity is moderate to low. Natural fertility is low.

These soils are so stony that they are not suitable for cultivation. The cleared areas are suitable for pasture. Clearing the trees and removing the stones to establish a new pasture, however, generally is not economically feasible. (Capability unit VIs-1)

Edgemont and Dekalb very stony sandy loams, 25 to 70 percent slopes (EdF).—These soils are mainly on the sides or upper peaks of Blue Mountain and on the ridges of South Mountain and the Reading Hills. Generally, they are shallower than the gently sloping Edgemont and Dekalb soils, and outcrops of bedrock occur in many areas. In places areas of Rubble land were included with these soils in mapping. Erosion has been only slight in most places. Natural fertility is low.

These soils are so stony and steep that they are not suitable for cultivated crops or pasture. (Capability unit VIIs-1)

Fogelsville Series

The Fogelsville series consists of deep, well-drained, nearly level to sloping, silty soils that have formed in material weathered from shaly limestone or cement rock. These soils are in the central part of the county, along the northern side of the limestone valley.

In a cultivated soil typical of the Fogelsville series, the plow layer is dark-brown silt loam about 8 inches thick. The subsoil, between depths of 8 and 38 inches, is yellowish-brown, friable silt loam that has blocky structure. The substratum is yellowish-brown, soft, weathered shale. The material in the substratum grades to grayish-brown, firm cement rock at some depth between 46 and 56 inches. The subsoil contains coarse fragments, and about 80 percent of the substratum is coarse fragments.

Permeability is moderate, and the available moisture capacity is high. Surface runoff is slow to rapid. These soils have a friable surface layer and are easily tilled. They are easily eroded, however, because of their silty texture.

In general, the Fogelsville soils are suitable for farming. Most of the acreage is in crops, but a few small areas are in pasture or trees. Several large quarries from which limestone or cement rock are removed are located within the areas.

Representative profile of Fogelsville silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field, 2 miles north of Stouchsburg:

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, very fine, granular structure; friable when moist; slightly acid (pH 6.4 where lime has been applied); abrupt, wavy boundary. 7 to 8 inches thick.

A2—8 to 11 inches, yellowish-brown (10YR 5/4) silt loam; few small quartz fragments; weak, fine, subangular blocky structure; friable when moist; neutral (pH 6.7 where lime has been applied); clear, wavy boundary. 2 to 4 inches thick.

B1—11 to 14 inches, yellowish-brown (10YR 5/6) silt loam; 5 percent of horizon is coarse fragments; weak, fine and medium, subangular blocky structure; friable when moist; few thin clay films; neutral (pH 6.7); clear, wavy boundary. 2 to 4 inches thick.

B21t—14 to 27 inches, yellowish-brown (10YR 5/8) silt loam; few small, coarse fragments; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; medium to thick clay films on ped surfaces; slightly acid (pH 6.4); diffuse, wavy boundary. 10 to 15 inches thick.

B22t—27 to 38 inches, yellowish-brown (10YR 5/6) silt loam; 10 percent of horizon is coarse fragments; moderate, medium, subangular blocky structure; friable when moist, sticky and plastic when wet; thick clay films on ped surfaces; tendency toward vertically oriented cleavage surfaces; strongly acid (pH 5.4); clear, wavy boundary. 10 to 16 inches thick.

C1—38 to 46 inches, yellowish-brown (10YR 5/4) weathered shale; 80 percent of horizon is shale fragments; grayish-brown (2.5Y 5/2), structureless, soft, horizontal shale fragments; thick clay films on top of layer of shale; neutral (pH 6.6); clear, wavy boundary. 5 to 9 inches thick.

C2—46 to 56 inches, structureless mass of soft, horizontal shale fragments; neutral (pH 6.6); clear, wavy boundary. 8 to 12 inches thick.

R—56 inches +, grayish-brown (2.5Y 5/2) cement rock.

Color throughout the solum ranges from dark brown or brown to light yellowish brown. In the solum the content of coarse fragments of soft shale and of vein quartz ranges from only a few fragments to as much as 10 percent. Reaction throughout the profile ranges from neutral to strongly acid. Depth to bedrock generally ranges from 4 to 6 feet.

Fogelsville soils occur with moderately deep, well drained Ryder; deep, moderately well drained Wiltshire; and poorly drained Burgin soils.

Fogelsville silt loam, 0 to 3 percent slopes (FoA).—The plow layer of this soil is thicker and darker colored than the one in the profile described as typical for the series, and bedrock is at a greater depth. The available moisture capacity and natural fertility are high. The hazard of erosion is slight.

This soil is easily worked and has few limitations to use for farming. Frost heaving is a hazard in some areas. (Capability unit I-1)

Fogelsville silt loam, 3 to 8 percent slopes, moderately eroded (FoB2).—This soil has the profile described as typical for the series. It is gently sloping. Runoff is medium, and there is a moderate hazard of further erosion.

Included in mapping were a few small areas of severely eroded soils. In those areas the plow layer consists mainly of material from the subsoil and has a lighter color than the original surface layer.

The risk of further erosion is the major limitation to farm use. (Capability unit IIe-1)

Fogelsville silt loam, 8 to 15 percent slopes, moderately eroded (FoC2).—This sloping soil has already lost

some soil material through accelerated erosion. Surface runoff is rapid, and further severe erosion is a hazard. The profile is somewhat shallower over bedrock than the one described as typical for the series. Included in mapping were small areas of moderately steep soils that are severely eroded.

This Fogelsville soil is fairly well suited to farm use. (Capability unit IIIe-1)

Glenville Series

In the Glenville series are deep, moderately well drained, nearly level or gently sloping soils that formed in material weathered from granitic gneiss. These soils occur in rather small areas in the east-central part of the county. They are in the hills east of Reading.

In a cultivated soil typical of the Glenville series, the plow layer is very dark grayish-brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of about 20 inches, is strong-brown, mottled silt loam that has blocky or platy structure. A fragipan, consisting of strong-brown or dark-brown, mottled silt loam or heavy silt loam is at a depth between 20 and 27 inches. The fragipan is firm and brittle and has thick, platy structure. The lower part of the subsoil, between depths of 27 and 40 inches, is dark-brown, mottled loam. The substratum, below a depth of 40 inches, is dark-brown loam that has weak, thin, platy structure.

The available moisture capacity is moderate, and permeability is moderately slow throughout the profile. These soils have a seasonal high water table.

The Glenville soils are mainly in pasture or trees. Small areas are in cultivated crops.

Representative profile of Glenville silt loam, 0 to 3 percent slopes, in a hayfield one-half mile north of Lobachsville:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable when moist; slightly acid (pH 6.2 where lime has been applied); abrupt, smooth boundary. 6 to 8 inches thick.

B1—8 to 13 inches, strong-brown (7.5YR 5/8) silt loam; weak, fine, subangular blocky structure; friable when moist; medium acid (pH 6.0); clear, wavy boundary. 4 to 6 inches thick.

B2t—13 to 20 inches, strong-brown (7.5YR 5/6) silt loam; many, fine, distinct, pale-brown (10YR 6/3) mottles; coarse blocky structure breaking to medium platy structure; friable to firm when moist, sticky and slightly plastic when wet; common clay films on ped surfaces; iron and manganese coatings; slightly acid (pH 6.5); clear, wavy boundary. 5 to 10 inches thick.

Bx—20 to 27 inches, strong-brown (7.5YR 5/6) and dark-brown (7.5YR 4/4) silt loam; many, medium, prominent, light brownish-gray (2.5Y 6/2) mottles; moderate, thick, platy structure; firm and brittle when moist, sticky and plastic when wet; thick clay films; few iron and manganese coatings; medium acid (pH 5.6); gradual, wavy boundary. 7 to 10 inches thick.

B3—27 to 40 inches, dark-brown (7.5YR 4/4) loam; common, fine, prominent, light brownish-gray (2.5Y 6/2) mottles; moderate, medium, subangular blocky structure; friable to firm when moist, sticky and slightly plastic when wet; thick clay films lining pores; few iron and manganese coatings; strongly acid (pH 5.4); gradual, wavy boundary. 10 to 16 inches thick.

C—40 to 60 inches +, dark-brown (7.5YR 4/4) loam; weak, thin, platy structure; friable when moist; strongly acid (pH 5.1).

Color of the Ap horizon ranges from dark brown to dark grayish brown or very dark grayish brown, and the color of the B horizons ranges from strong brown to yellowish brown. In places numerous pieces of granitic gneiss and fragments of quartzite are in the Ap horizon and throughout the solum. The texture of the B2t horizon ranges from loam to silty clay loam. Depth to hard rock ranges from 3½ to 8 feet or more.

Glenville soils occur with the deep, well-drained Chester and Edgemont soils and with the moderately deep, well-drained Brandywine soils. They are generally adjacent to poorly drained Baile soils. All of these soils formed in similar material.

Glenville silt loam, 0 to 3 percent slopes (G1A).—This soil is on the floors of valleys or in depressions, and it is level or nearly level. It has the profile described as typical for the series.

Surface runoff is slow or very slow, and there is little or no hazard of erosion. A fragipan inhibits the development of roots and slows the movement of water through the profile. This soil has a seasonal high water table. Because of wetness, it is not well suited to crops. (Capability unit IIw-1)

Glenville silt loam, 3 to 8 percent slopes, moderately eroded (G1B2).—This soil is on the side slopes of valleys where seep water or surface water collects. It has lost as much as one-half of its original surface layer through erosion, and some material from the subsoil has been mixed with the plow layer in tillage. Small areas of strongly sloping soils were included with this soil in mapping.

Runoff is slow to medium, and the hazard of further erosion is moderate. The hazard of erosion and a slowly permeable fragipan that causes a seasonal high water table are the main limitations of this soil to farm use.

Wetness limits the kinds of crops that can be grown to those that can tolerate a seasonal high water table. (Capability unit IIe-4)

Hagerstown Series

The Hagerstown series consists of deep, well-drained, strongly sloping to gently rolling soils formed in material that weathered from relatively pure limestone. These soils are mainly in the limestone valley in the central and western parts of the county.

In a cultivated soil typical of the Hagerstown series, the surface layer is dark yellowish-brown silt loam about 8 inches thick. The subsoil is strong-brown silt loam or silty clay loam in the upper part and is yellowish-red silty clay or silty clay loam in the lower part. It has moderate to strong blocky structure. Hard, bluish-gray limestone or dolomite is at a depth of more than 50 inches.

Surface runoff is slow to rapid, and it causes a slight to moderate hazard of erosion. Natural fertility is high, and permeability is moderate throughout the profile. The available moisture capacity is high to medium. Reaction is slightly acid or neutral in most places.

In moderately eroded areas, tillage extends into the subsoil. In these areas the soils are somewhat difficult to till because the subsoil is finer textured than the original surface layer. Where the plow layer is in subsoil material,

tillage must be done at just the right moisture content if a desirable seedbed is to be prepared. Hagerstown soils that are not too steep are generally suited to the crops commonly grown in the county.

Most of the acreage is in field crops and is farmed intensively. Further erosion is the major hazard.

Representative profile of Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field north of Sinking Spring:

Ap—0 to 8 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, medium, granular structure; friable; neutral (pH 7.2 where lime has been applied); abrupt, smooth boundary, 7 to 9 inches thick.

B1—8 to 14 inches, strong-brown (7.5YR 5/6) silt loam; moderate, fine, blocky structure; friable when moist, sticky and slightly plastic when wet; neutral (pH 7.2); clear, wavy boundary. 4 to 7 inches thick.

B21t—14 to 18 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, fine, blocky structure; firm when moist, sticky and plastic when wet; thick clay films; neutral (pH 7.2); gradual, wavy boundary. 3 to 4 inches thick.

B22t—18 to 30 inches, yellowish-red (5YR 4/6) silty clay; strong, medium, blocky structure; firm when moist, sticky and plastic when wet; neutral (pH 7.2); continuous clay films; diffuse, wavy boundary. 12 to 20 inches thick.

B23t—30 to 40 inches, yellowish-red (5YR 4/6) silty clay; strong, medium, blocky structure; firm when moist, sticky and plastic when wet; thick, continuous clay films; neutral (pH 7.0); diffuse, wavy boundary. 10 to 16 inches thick.

B24t—40 to 53 inches, yellowish-red (5YR 5/8) silty clay loam; strong, medium, blocky structure breaking to fine blocky structure; firm when moist, sticky and plastic when wet; thick clay films; neutral (pH 7.0). 10 inches or more thick.

R—53 inches +, bluish-gray (5B 5/1 to 6/1) limestone.

The color of the A horizon ranges from dark brown to dark yellowish brown, and the color of the B horizons ranges from strong brown to yellowish red or red. The texture of the B horizons ranges from silt loam to silty clay loam or clay. Depth to hard bedrock ranges from 3½ to 6 feet or more. Reaction ranges from neutral, where the soils have been limed, to slightly acid, where the soils have not been limed.

Hagerstown soils occur with deep, well drained Duffield and Washington soils, with moderately well drained Wiltshire soils, and with poorly drained Burgin soils. Also in some places they are near areas of Murrill, Ryder, or Fogelsville soils. The areas of Hagerstown soils contain more outcrops of limestone than is typical in areas of Duffield and Washington soils.

Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded (HaB2).—This soil has the profile described as typical for the series. Part of its original surface layer has been lost through erosion, and the present plow layer is finer textured and somewhat more difficult to work than the original one. Included in mapping were small areas of severely eroded soils.

Surface runoff is slow to medium. The susceptibility to further erosion is moderate.

This soil is suitable for general farming. If it is cultivated, a suitable rotation is one of medium intensity. Practices that reduce the runoff, that give protection from erosion, and that maintain the supply of organic matter are needed. Sinkholes and the hazard of contamination of the ground water are limitations to many uses. (Capability unit IIe–1)

Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded (HaC2).—This soil has lost as much as half of its original surface layer through erosion, and rock ledges are common. Sinkholes are less common than in Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded.

Surface runoff is medium to rapid, and the hazard of further erosion is severe. Natural fertility is high. The available moisture capacity is moderate to high, and permeability throughout the profile is moderate.

This soil is suitable for farming. If it is cultivated, a crop rotation of low intensity is suitable. Practices that divert or reduce the runoff, that give protection from erosion, and that maintain the supply of organic matter are needed. The slopes and the susceptibility to further erosion are the main limitations to use for farming. Sinkholes and the hazard of contamination of the ground water are limitations to many uses. (Capability unit IIIe–1)

Klinesville Series

In the Klinesville series are well-drained, gently sloping to moderately steep soils that are shallow over red shale. These soils are in the north-central part of the county and are also in the southern part of the county in an area underlain by red rocks of Triassic age.

In a cultivated soil typical of the Klinesville series, the plow layer is dark reddish-brown, strongly acid shaly silt loam about 8 inches thick. The subsoil is reddish-brown, strongly acid very shaly silt loam about 7 inches thick. Below the subsoil is a mass of dark-red fragments of shale and a small amount of soil material. The fragments of shale are strongly acid.

The available moisture capacity is low. Permeability is moderately rapid throughout the profile.

Some areas of Klinesville soils can be used for crops. These soils are droughty, and they have a shallow rooting depth.

Representative profile of Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 2 miles west of Shartlesville:

Ap—0 to 8 inches, dark reddish-brown (5YR 3/4) shaly silt loam; 30 percent of horizon is shale fragments; weak, fine, granular structure; friable when moist, slightly sticky when wet; strongly acid (pH 5.4); abrupt, smooth boundary. 6 to 8 inches thick.

B2—8 to 15 inches, reddish-brown (5YR 4/4) very shaly silt loam; 75 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; strongly acid (pH 5.4); gradual, wavy boundary. 5 to 10 inches thick.

C—15 to 19 inches, reddish-brown (5YR 4/3) silt films on and between shale chips; structureless; 95 percent of horizon is coarse fragments; strongly acid (pH 5.4); clear, wavy boundary. 2 to 5 inches thick.

R—19 inches +, dusky-red (2.5YR 3/2), partly weathered shale.

The color throughout the profile ranges from dark reddish brown to red. Depth to hard rock ranges from 10 to 20 inches. Reaction ranges from neutral, where lime has been applied, to very strongly acid, where no lime has been applied. The content of shale fragments in the solum ranges from 30 to 90 percent. It generally becomes greater with increasing depth.

Klinesville soils occur with Berks soils in the northern part of the county. They also occur with Penn, Readington, and Croton soils in the southern part.

Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded (KlB2).—This gently sloping soil is on

ridgetops. It has the profile described as typical for the series.

Included with this soil in mapping were areas of severely eroded soils that have lost most of their original surface layer through erosion. In those areas tillage has mixed part of the shaly subsoil with the material in the plow layer.

Runoff is slow. The hazard of further erosion is moderate.

This soil is fairly well suited to cultivated crops. It is limited for that use, however, by the hazard of further erosion. (Capability unit IIIe-4)

Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded (K1C2).—This soil has a thinner profile than the one described as typical for the series. Included with it in mapping were small areas of severely eroded soils.

Surface runoff is medium, and the hazard of further erosion is severe. The available moisture capacity is low, and this soil is extremely droughty. Slopes, damage from past erosion, shallowness, and the risk of further erosion are the major limitations of this soil to farm use. (Capability unit IVe-3)

Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded (K1D2).—The profile of this soil is generally thinner and more shaly than the one described as typical for the series. It is moderately steep.

Included with this soil in mapping were small areas of severely eroded soils that are more shaly and generally have a more reddish color than this Klinesville soil. In some areas of these included soils, the plow has cut into the bedrock.

Surface runoff is rapid. The hazard of further erosion is severe.

This soil is suitable for pasture, but it is droughty. Its major limitations to farm use are damage from past erosion, shallowness, and the risk of further erosion. (Capability unit VIe-2)

Klinesville shaly silt loam, 25 to 45 percent slopes, moderately eroded (K1F2).—The profile of this soil is similar to the one described as typical for the series, except that it is thinner and generally contains more coarse fragments. This soil is steep or very steep. Surface runoff is very rapid, and the hazard of further erosion is very severe.

Included with this soil in mapping were areas of severely eroded soils that have lost all or nearly all of their surface layer through erosion. In those areas the plow has cut into the shale bedrock.

This Klinesville soil is droughty. It is suitable for trees, recreation, wildlife habitat, and watershed protection, but it is not suitable for farming. (Capability unit VIIe-2)

Laidig Series

In the Laidig series are deep, nearly level to moderately steep, well-drained soils formed in colluvial deposits derived from sandstone, shale, and quartzite. These soils are on the lower slopes of Blue Mountain along the northern edge of the county.

In a wooded soil typical of the Laidig series, the surface layer is covered by a layer of leaves and twigs, 1 to 3 inches thick, over a thin mat of black organic matter that has a small amount of silt and sand mixed with the organic matter. The surface layer is grayish-brown, very strongly acid very stony loam about 4 inches thick. The upper part of the subsoil, extending to a depth of about 23 inches, is yellowish-brown to strong-brown gravelly loam to gritty clay loam that has blocky structure. Between a depth of 23 and 38 inches, the subsoil consists of yellowish-red gravelly clay loam that has blocky structure. A fragipan is below a depth of 38 inches. It is strong-brown to brown, mottled, firm and brittle gravelly loam that has coarse prismatic structure, with platy structure inside the peds. The substratum is brown gravelly loam.

Natural fertility and the available moisture capacity are moderate. Permeability is moderately slow. A fragipan in the lower part of the subsoil restricts the movement of water.

Laidig soils are mainly in wooded areas. Some areas have been cleared of stones and trees, however, and are farmed. Small areas are used for pasture. Generally, these soils are suitable for farming.

Representative profile of Laidig very stony loam, 8 to 25 percent slopes, in woodland near the intersection of Highway Nos. 419 and 183, Bethel Township:

O1—3 inches to 1 inch, undecayed hardwood leaf litter.

O2—1 inch to 0, black, decomposed humus layer containing a small amount of intermixed fine sand and silt.

A2—0 to 4 inches, grayish-brown (10YR 5/2) very stony loam; moderate, fine, granular structure; very friable when moist, nonsticky and nonplastic when wet; very strongly acid (pH 4.6); abrupt, wavy boundary. 2 to 5 inches thick.

B1—4 to 13 inches, yellowish-brown (10YR 5/6) gravelly loam; 15 percent of horizon is sandstone and quartz gravel; weak, medium, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; thin, patchy clay films on peds; very strongly acid (pH 4.8); clear, wavy boundary. 8 to 10 inches thick.

B21t—13 to 23 inches, strong-brown (7.5YR 5/6) gritty clay loam; 10 percent of horizon is gravel; moderate, medium, subangular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; thin, continuous clay films on peds; very strongly acid (pH 4.8); clear, wavy boundary. 10 to 12 inches thick.

B22t—23 to 38 inches, yellowish-red (5YR 5/6) gravelly clay loam; 15 to 20 percent of horizon is sandstone gravel and shale fragments; moderate, medium, subangular blocky structure; firm when moist, sticky and slightly plastic when wet; thin, continuous clay films on peds; very strongly acid (pH 4.8); clear, wavy boundary. 15 to 18 inches thick.

Bx1—38 to 45 inches, strong-brown (7.5YR 5/6) gravelly loam; 20 to 25 percent of horizon is shale and sandstone fragments; many, medium, distinct mottles of light brownish gray (10YR 6/2); moderate, very coarse, prismatic structure, with moderate, medium and thick, platy structure in interior of peds; firm when moist, slightly sticky and slightly plastic when wet; many medium iron coatings and thin clay films on ped surfaces; very strongly acid (pH 5.0); gradual, wavy boundary. 7 to 10 inches thick.

Bx2—45 to 55 inches, brown (7.5YR 5/4) gravelly loam; 30 percent of horizon is shale and sandstone fragments; many, medium, distinct mottles of light brownish-gray (10YR 6/2) and yellowish red (5YR 4/6); moderate, very coarse, prismatic structure, with weak, medium, prismatic structure in interior of peds; firm, thin, patchy clay films on ped surfaces; many medium iron and manganese coatings; very strongly

acid (pH 5.0) ; gradual, wavy boundary. 9 to 16 inches thick.

Cx—55 inches +, brown (7.5YR 5/4) gravelly loam; 30 to 40 percent of soil material is shale and sandstone fragments; medium, distinct mottles of light brownish gray (10YR 6/2); weak, thin, platy structure to massive; firm when moist, slightly sticky and slightly plastic when wet; few thin iron and manganese coatings; very strongly acid (pH 5.0).

The A2 horizon ranges from very stony loam to channery loam. Originally, the areas of channery loam were stony, but they have been cleared of large stones. Texture of the B2t horizons ranges from loam or sandy loam to clay loam, and texture of the fragipan ranges from sandy clay loam to gravelly loam. The A2 horizon generally has a hue of 10YR. The B horizons have a hue of 7.5YR to 5YR, a value of 4 or 5, and chroma of 4 to 8. The content of coarse fragments ranges from 5 to about 50 percent, by volume. Reaction ranges from strongly acid to extremely acid, except for less acid areas that have received lime.

The Laidig soils occur with deep, moderately well drained Buchanan and poorly drained Andover soils. They lie below areas of Dekalb and Edgemont soils and above areas of Berks soils.

Laidig channery loam, 3 to 8 percent slopes, moderately eroded (LaB2).—In this soil, clearing and cultivation have mixed the layers of organic matter into the surface layer of mineral material to form a dark grayish-brown plow layer about 7 inches thick. This soil is not stony but is channery. It is mainly on the lower slopes of Blue Mountain or in the valley below these slopes. In the valley it extends into areas of Berks soils.

Surface runoff is medium. The hazard of further erosion is slight.

This soil is generally suitable for farming. The major limitations to farm use are the slopes and damage from past erosion. (Capability unit IIe–2)

Laidig channery loam, 8 to 15 percent slopes, moderately eroded (LaC2).—This soil is on the lower midslopes of Blue Mountain. It is fairly free of stones. Cultivation has mixed the layers of organic matter into the surface layer of mineral material to form a dark grayish-brown plow layer about 7 inches thick. Included with this soil in mapping were small areas of severely eroded soils that have lost most of their original surface layer.

Runoff is medium on this sloping soil. Further erosion is a severe hazard.

In general, this soil is fairly well suited to farming. The major limitations to farm use are the slopes and the risk of further erosion. (Capability unit IIIe–2)

Laidig very stony loam, 0 to 8 percent slopes (LdB).—This soil is on the lower slopes of Blue Mountain or in the valley below the slopes, where it extends into areas of Berks soils. Its profile is slightly thinner than the one described as typical for the series. Surface runoff is medium.

This soil is not suitable for farming, because of the large number of stones. Where the trees have been cleared, this soil is often used for pasture. Generally, however, the cost of cutting the trees and of clearing the stones so that a new pasture can be established is not considered worthwhile. (Capability unit VIs–1)

Laidig very stony loam, 8 to 25 percent slopes (LdD).—This soil has the profile described as typical for the series. It is sloping to moderately steep and is on the lower midslopes of Blue Mountain.

Runoff is medium to rapid. Trees and stones protect this soil so that the hazard of erosion is not so great as it would be in unprotected areas.

This soil is not suitable for farming, because of stones on the surface and in the soil profile. Areas cleared of trees can be used for pasture. Generally, however, the cost of cutting the trees and of removing the stones so that a new pasture can be established is not considered worthwhile. The major limitations to farm use are the slopes and the large number of stones. (Capability unit VIs–1)

Lamington Series

The Lamington series consists of deep, poorly drained, reddish soils that have formed in alluvial sediment derived largely from red shale, sandstone, and conglomerate. These soils are nearly level. They are on terraces along the Schuylkill River in the southeastern part of the county and are seldom flooded.

In a cultivated soil typical of the Lamington series, the plow layer is pinkish-gray, mottled silt loam about 8 inches thick. The upper part of the subsoil, extending to a depth of 18 inches, is pinkish-gray, mottled clay loam that has blocky structure. The lower part, between a depth of 18 inches and a depth of about 48 inches, is a fragipan consisting of pinkish-gray, mottled clay loam. In general, the fragipan has prismatic structure, but the structure becomes platy with increasing depth. The substratum is reddish-brown, mottled fine sandy loam.

The available moisture capacity is moderate. Permeability is slow throughout the profile.

Lamington soils are not well suited to farming, because of wetness and a high water table.

Representative profile of Lamington silt loam in a hayfield 1½ miles southeast of Douglassville:

Ap—0 to 8 inches, pinkish-gray (5YR 6/2) silt loam; common, fine, distinct, reddish-yellow (7.5YR 6/8) mottles; weak, fine, granular structure; friable when moist, slightly sticky when wet; slightly acid (pH 6.2 where lime has been applied); abrupt, smooth boundary. 6 to 8 inches thick.

B21tg—8 to 18 inches, pinkish-gray (5YR 6/2) clay loam; many, medium, distinct, yellowish-red (5YR 5/8) and strong-brown (7.5YR 5/6) mottles; moderate, medium and coarse, blocky structure; firm when moist, sticky and plastic when wet; thick clay films; medium acid (pH 5.8) ; clear, wavy boundary. 8 to 10 inches thick.

Bx1g—18 to 32 inches, pinkish-gray (5YR 6/2) clay loam; 15 percent of horizon is gravel and cobblestones, as much as 4 inches in diameter; common, distinct, gray (5YR 6/) and many medium, distinct, yellowish-red (5YR 5/8) mottles; weak, coarse, prismatic structure, but the peds have moderate, medium, platy structure in the interiors; very firm when moist, sticky and slightly plastic when wet; thick clay films; strongly acid (pH 5.2) ; gradual, irregular boundary. 10 to 14 inches thick.

Bx2g—32 to 48 inches, pinkish-gray (5YR 6/2) silt loam; 10 percent of horizon is coarse fragments; many, medium, distinct, light reddish-brown (5YR 6/3) and few, fine, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, platy structure; firm when moist, sticky and slightly plastic when wet; thick clay films; few iron and manganese films; very strongly acid (pH 5.0) ; gradual, irregular boundary. 12 to 16 inches thick.

IIC—48 to 52 inches +, reddish-brown (5YR 5/3) fine sandy loam; many, medium, distinct, pinkish-gray (5YR 6/2) mottles and common, fine, prominent, red (2.5YR

4/6) mottles; moderate, medium, platy structure; friable when moist, slightly sticky when wet; thin clay films; very strongly acid (pH 4.8).

The color of the Ap horizon ranges from dark brown to pinkish gray, and the color of the Bx horizons ranges from pinkish gray to reddish brown. The texture of all the B horizons ranges from silt loam to clay loam. Depth to bedrock ranges from 4 to 20 feet. Reaction ranges from slightly acid, where the soils have been limed, to very strongly acid in areas that have not received lime.

Lamington soils are the poorly drained members of the drainage sequence that includes the moderately well drained Raritan and well drained Birdsboro soils.

Lamington silt loam (Lg).—This is the only Lamington soil mapped in Berks County. It is nearly level and is on terraces along the Schuylkill River in the southeastern part of the county. The profile is the one described as typical for the series.

Runoff is slow, and there is little or no hazard of erosion. A fragipan in the subsoil, however, is slowly permeable to water and is a barrier to the penetration of roots. The high water table limits the choice of plants that can be grown.

This soil can be more easily managed and improved for cropping by removing the excess water through drainage. Where this soil is not drained, pasture is a better long-term use than field crops. (Capability unit IVw-1)

Lehigh Series

The Lehigh series consists of soils that are deep, moderately well drained, and nearly level to sloping. These soils have formed in material that weathered from metamorphosed red sandstone, conglomerate, and shale. They occur near diabase intrusions, mainly in the southern part of the county.

In a cultivated soil typical of the Lehigh series, the plow layer is dark grayish-brown silt loam that contains a few angular fragments of stone and is about 8 inches thick. The upper part of the subsoil, between a depth of 8 and about 14 inches, is very dark grayish-brown, friable silt loam that has granular structure. Between a depth of 14 and 50 inches, the subsoil is very dark grayish-brown to dark-brown, mottled channery silt loam to channery clay loam that has subangular blocky structure. The substratum is at a depth of 50 inches. About 95 percent of the substratum consists of fragments of dark shale.

The available moisture capacity is medium to high, natural fertility is low, and permeability is moderate to slow. The water table is high in some seasons.

Lehigh soils are only fairly well suited to cultivated crops. Most of the acreage is idle or in trees, but some areas are used for crops or pasture.

Representative profile of Lehigh silt loam, 3 to 8 percent slopes, moderately eroded, in a hayfield 1 mile east of Mohnton:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; few coarse fragments up to 4 inches in diameter; weak, fine, granular structure; very friable when moist, slightly acid (pH 6.5 where lime has been applied); abrupt, smooth boundary. 6 to 8 inches thick.

B1—8 to 14 inches, very dark grayish-brown (10YR 3/2) silt loam; 10 percent of horizon is coarse fragments; weak, fine, granular structure; friable when moist, slightly sticky when wet; slightly acid (pH 6.5); clear, wavy boundary. 4 to 6 inches thick.

B21tg—14 to 30 inches, very dark grayish-brown (10YR 3/2) channery silt loam; 20 percent of horizon is coarse fragments; many, medium, distinct, yellowish-red (5YR 4/6) mottles; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common patches of clay films; slightly acid (pH 6.2); gradual, wavy boundary. 12 to 16 inches thick.

B22tg—30 to 41 inches, dark-brown (7.5YR 4/2) channery silt loam; 20 percent of horizon is coarse fragments; medium, distinct, reddish-brown (5YR 4/4) mottles; moderate, medium, subangular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; common thin clay films; slightly acid (pH 6.2); gradual, irregular boundary. 10 to 14 inches thick.

B23tg—41 to 50 inches, dark-brown (7.5YR 3/2) channery clay loam; 30 percent of horizon is coarse fragments; medium, distinct, dark reddish-brown (5YR 3/4) mottles; moderate, coarse, subangular blocky structure; firm when moist, sticky and plastic when wet; thick clay films; common iron and manganese coatings; medium acid (pH 5.8); gradual, irregular boundary. 8 to 14 inches thick.

C—50 to 54 inches +, dark-brown (7.5YR 4/2) silt loam deposits on and between angular, metamorphosed sandstone fragments; 95 percent of horizon is coarse fragments; medium acid (pH 6.0).

The color of the Ap horizon ranges from very dark gray to very dark grayish brown or dark grayish brown. The texture of the B horizons ranges from channery silt loam to channery silty clay loam or clay loam. Depth to hard rock ranges from 3½ to 6 feet. The amount of coarse fragments ranges from 5 to 20 percent in the upper part of the solum, and from 20 to 60 percent in the lower part. Reaction is slightly acid to medium acid, except in areas where the soils have received a large amount of lime.

Lehigh soils are near deep, well-drained Brecknock and Neshaminy soils and near moderately deep, well-drained Penn soils.

Lehigh silt loam, 0 to 3 percent slopes (LhA).—This soil has a surface layer that is thicker than the one in the profile described as typical for the series. It is nearly level.

Runoff is slow, and erosion is not a hazard or is only a slight hazard. A seasonal high water table, low natural fertility, and a large number of coarse fragments in the profile are major limitations to farm use.

This soil is suitable for farming. Improving drainage makes it more suitable for crops and easier to manage. (Capability unit IIIw-1)

Lehigh silt loam, 3 to 8 percent slopes, moderately eroded (LhB2).—This soil is on the middle parts of slopes. Its profile is the one described as typical for the series.

Runoff is slow, but some water is received from higher areas, which causes a slight hazard of further erosion. The water table is high in some seasons. Bedrock is near the surface, and natural fertility is low.

This soil is fairly well suited to farming. Improving drainage helps to remove the excess surface and subsurface water. Proper management is needed to make this soil more suitable for crops. (Capability unit IIIw-1)

Lehigh silt loam, 8 to 15 percent slopes, severely eroded (LhC3).—This soil has a profile similar to that described as typical for the series, but it is steeper and has lost most of its original surface layer through erosion. The present surface layer consists mostly of material from the subsoil, but it contains a small amount of material left from the original surface layer.

Included with this soil in mapping were some small areas of soils that are steeper than this soil. Some of these included areas are severely eroded.

Surface runoff is medium. The hazard of further erosion is severe.

This soil can be farmed, but a seasonal high water table is a limitation to use for farming. (Capability unit IVe-3)

Lewisberry Series

Deep, well-drained, moderately coarse textured soils that are gently sloping to steep make up the Lewisberry series. These soils have formed in material that weathered from red sandstone, conglomerate, and some shale. They are in the southern part of the county.

In a wooded soil typical of the Lewisberry series, the surface layer is covered by a layer of leaves. Beneath the leaves is a mat, about one-half inch thick, of black organic matter consisting of partly decayed leaves and twigs. The mineral surface layer, beneath the layer of organic matter, is very dark grayish-brown very stony sandy loam about 4 inches thick. The subsurface layer, between depths of 4 and 10 inches, is reddish-brown gravelly coarse sandy loam. It is underlain by a similar layer, about 2 inches thick, that is transitional to the subsoil. The upper part of the subsoil, between depths of 12 and about 16 inches, is reddish-brown gravelly coarse sandy loam that has subangular blocky structure. The lower part, between depths of 16 and about 36 inches, is reddish-brown gravelly coarse sandy loam to gravelly loam that has blocky and platy structure. The substratum is dark-red gravelly sandy clay loam that has blocky structure tending to platiness. Within a short vertical distance, the material in the substratum grades to soft, red sandstone and conglomerate, which are at a depth of about 50 inches.

Hilly areas of these soils in trees are not seriously eroded. Areas that have been cleared for fields, however, are severely eroded in many places. The available moisture capacity is moderate, and the soils tend to be droughty. Permeability is moderately rapid throughout the profile. Many of the stony areas are under forest.

Representative profile of Lewisberry very stony sandy loam, 8 to 25 percent slopes, on Pennsylvania State land, Union Township, 1¼ miles north of Cold Run Station on the south side of Route No. T347. (This is the location of profile S62 Pa-6-8 (0-9) sampled for laboratory characterization analysis, tables 10 and 11 in the section "Laboratory Determinations."):

O1—1½ inches to ½ inch, oak leaf litter; 1 to 2 inches thick.

O2—½ inch to 0, black (5YR 2/1) organic matter from leaf mold; extremely acid (pH 4.4); abrupt, wavy boundary. One-half inch to 1 inch thick.

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) very stony sandy loam; 35 percent of horizon is coarse fragments; weak, fine, granular structure; very friable when moist, nonsticky when wet; very strongly acid (pH 4.5); clear, wavy boundary, 2 to 5 inches thick.

A2—4 to 10 inches, reddish-brown (5YR 4/3) gravelly coarse sandy loam; 20 percent of horizon is coarse fragments; weak, fine, granular structure; very friable when moist, nonsticky and nonplastic when wet; extremely acid (pH 4.4); clear, wavy boundary. 5 to 8 inches thick.

A3—10 to 12 inches, reddish-brown (5YR 4/3) gravelly coarse sandy loam; 20 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; very strongly acid (pH 4.6); clear, wavy boundary. 1½ to 3 inches thick.

B1—12 to 16 inches, reddish-brown (2.5YR 4/4) gravelly coarse sandy loam; 25 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist, slightly sticky and nonplastic when wet; very strongly acid (pH 4.8); clear, wavy boundary. 3 to 5 inches thick.

B21t—16 to 24 inches, reddish-brown (2.5YR 4/4) gravelly coarse sandy loam; 30 percent of horizon is coarse fragments; weak, medium, blocky structure; friable when moist, slight sticky and slightly plastic when wet; thin, partial clay films on the peds and lining pores; very strongly acid (pH 4.6); gradual, wavy boundary. 6 to 10 inches thick.

B22t—24 to 30 inches, reddish-brown (2.5YR 4/4) gravelly coarse sandy loam; 30 percent of horizon is coarse fragments; weak, medium, block structure; friable when moist, sticky and slightly plastic when wet; thin, partial clay films on the peds and lining pores; very strongly acid (pH 4.6); clear, wavy boundary. 5 to 9 inches thick.

B23t—30 to 36 inches, reddish-brown (2.5YR 4/4) gravelly loam; 25 percent of horizon is coarse fragments; weak, medium, platy and blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thin, partial clay films on the peds and lining pores; very strongly acid (pH 4.6); gradual, wavy boundary. 4 to 8 inches thick.

C—36 to 50 inches, dark-red (2.5YR 3/6) gravelly sandy clay loam; 15 percent of horizon is coarse fragments; weak, medium, blocky structure tending to platiness; when moist, firm in place but friable if displaced; nonsticky and nonplastic when wet; very strongly acid (pH 5.0).

In cultivated areas of these soils, the color of the Ap horizon ranges from very dark grayish brown to reddish brown. The color of the B horizons ranges from reddish brown to dark red. The texture of each B horizon ranges from coarse sandy loam to loam. Depth to hard rock ranges from 3½ to 10 feet. The content of coarse fragments in the solum ranges from 15 to 45 percent. Where lime has not been applied, these soils are extremely acid or very strongly acid throughout the solum. Many stones and boulders of sandstone and conglomerate are on the surface of these soils in wooded areas. In most cultivated fields, the stones have been removed.

Lewisberry soils occur with the moderately deep, well drained Penn; the moderately well drained Readington; and the poorly drained Croton soils. Near them are deep, well-drained Athol soils and soils of the flood plains.

Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded (LrB2).—This is a nonstony soil that has been cultivated (fig. 8). Plowing has mixed the layers of organic matter from forest vegetation with the material in the surface layer. As a result, the present plow layer is dark reddish brown. The profile is thicker than the one described as typical for the series, and it is nonstony. Included in mapping were small areas of severely eroded soils.

Surface runoff is slow. The hazard of further erosion is slight.

Because of the favorable slopes, most areas of this soil have been cleared and are farmed. Droughtiness is the main limitation to use of this soil for farming. (Capability unit IIs-1)

Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded (LrC2).—The profile of this soil is similar to the one described as typical for the series, except that it is nonstony, has lost about one-half of its

Figure 8.—**A field of Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded, in corn. Trees in the background are on a Lewisberry very stony sandy loam.**

original surface layer through erosion, and contains a plow layer as a result of cultivation. Organic matter from forest vegetation that grew in the areas after this soil was first cultivated has been mixed into the plow layer.

Runoff is medium, and the hazard of further erosion is severe. This soil is somewhat droughty, but it is generally suited to cultivated crops. (Capability unit IIIe-5)

Lewisberry gravelly sandy loam, 8 to 15 percent slopes, severely eroded (LrC3).—This soil has lost most of its original surface layer through erosion. It is nonstony, and it has a plow layer as a result of cultivation. Organic matter from forest vegetation that grew in the areas after this soil was first cultivated has been mixed into the plow layer. The profile is thinner than the one described as typical for the series, and the soil material is more droughty.

Runoff is medium. The hazard of further erosion is moderate.

This soil is not well suited to cultivated crops. Strong slopes and the risk of even more severe erosion are the major limitations to use for farming. (Capability unit IVe-2)

Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded (LrD2).—This soil has lost about half of its original surface layer through accelerated erosion. It is nonstony, has a somewhat thinner profile and is more droughty than the soil for which a profile is described as typical for the series. Organic matter from forest vegetation that grew in the areas after this soil was first cultivated has been mixed into the plow layer by tillage.

Surface runoff is rapid. The hazard of further erosion is severe.

This soil is not well suited to cultivated crops. The major limitations to use for farming are the moderately steep slopes and the severe hazard of further erosion. (Capability unit IVe-2)

Lewisberry gravelly sandy loam, 15 to 25 percent slopes, severely eroded (LrD3).—This soil has lost more than three-fourths of its original surface layer through accelerated erosion. Unlike the soil for which a profile is described as typical for the series, this soil lacks stones on the surface. Also, it has been cultivated and it has a thinner profile. Organic matter from forest vegetation that grew in the area after this soil was first cultivated has been mixed into the plow layer.

Surface runoff is rapid, and the hazard of further erosion is severe. This soil is more droughty than it was originally.

In general, this soil is not suited to cultivated crops. It is suitable for trees, however, and can be used for wildlife areas, recreation, or protection of the watershed. The major limitations to use for farming are the moderately steep slopes and the hazard of further erosion. (Capability unit VIe-1)

Lewisberry gravelly sandy loam, 25 to 35 percent slopes, severely eroded (LrE3).—This soil is shallower and more droughty than the other Lewisberry soils. It does not have stones on the surface. More than three-fourths of the original surface layer has been lost through erosion. Included in mapping were small areas of soils that are less eroded than this soil.

Surface runoff is very rapid, and the hazard of further erosion is very severe. The steep slopes and the hazard of further erosion are the major limitations.

The risk of losing additional soil material and water is so great that this soil needs to be kept in trees and used for recreation or for protection of the watershed. The slopes are too steep for farm machinery to be safely operated. (Capability unit VIIe-1)

Lewisberry very stony sandy loam, 0 to 8 percent slopes (LsB).—This soil is less sloping than the one for which a profile is described as typical for the series. Included with it in mapping were small areas of yellowish or pinkish soils that are shallower over bedrock than this soil.

Little or no water runs off this Lewisberry soil, and the hazard of erosion is slight. The available moisture capacity is moderate, and natural fertility is low. The large number of stones in the surface layer is the major factor limiting farm use.

Where this soil has been cleared of trees, it is suitable for pasture. Nevertheless, clearing the trees and stones so that a new pasture can be established is generally too costly. This soil is suited to trees and can be used for recreation and for protection of the watershed. (Capability unit VIs-1)

Lewisberry very stony sandy loam, 8 to 25 percent slopes (LsD).—This soil has the profile described as typical for the series. Included with it in mapping were small areas of yellowish or pinkish soils that are shallower over bedrock than this soil.

Surface runoff is slow to rapid. If cultivated crops are grown, the hazard of erosion is moderate to severe. Practically all of the acreage is in trees, however, and little or no erosion has taken place in the wooded areas.

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Where this soil has been cleared of trees, it is suitable for pasture. Clearing the trees and stones so that a new pasture can be established is generally not practical. This soil is suited to trees and can be used for recreation or for protection of the watershed. (Capability unit VIs-1)

Lewisberry very stony sandy loam, 25 to 60 percent slopes (LsF).—This soil is steeper than the one for which a profile is described as typical for the series, and it contains more outcrops of bedrock. The profile is generally thinner than the one described as typical.

The hazard of erosion is very severe. Most of the areas are wooded, however, and little erosion has taken place.

This soil is too steep and too stony for farming. It can be used for trees, for protection of the watershed, for recreation, or for wildlife areas. (Capability unit VIIs-1)

Lindside Series

The Lindside series consists of deep, moderately well drained soils on flood plains. These soils are along streams in the valley that extends from Stouchsburg, in the western part of the county, through Reading, in the central part, and to Topton, in the eastern part. They also are on flood plains in Oley Valley. The soils are generally flooded in spring and during intense thunderstorms. They have formed in sediment that washed from uplands underlain by limestone.

In a cultivated soil typical of the Lindside series, the plow layer is very dark grayish-brown silt loam about 8 inches thick. The subsurface layer, about 4 inches thick, is dark-brown silt loam that grades to heavy silt loam. The subsoil between the depths of 12 and 18 inches is dark-brown heavy silt loam that has platy structure. Below a depth of 18 inches and down to a depth of about 33 inches the subsoil is dark-brown to dark grayish-brown, mottled heavy silt loam that has subangular blocky to platy structure. The substratum, which is between depths of 33 inches and about 45 inches, is yellowish-red, mottled gravelly clay loam. The lower part of the subsoil contains a large amount of gravel, and about 80 percent of the substratum consists of coarse fragments. The mottles in the subsoil indicate that water stands in these soils during some parts of the year.

Surface runoff is slow, and there is little or no hazard of erosion, except for stream gouging during floods. The water table is high during some seasons.

Representative profile of Lindside silt loam in a pasture along Cacoosing Creek, 2 miles north of Sinking Spring:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; 10 percent of horizon is gravel; weak, fine, granular structure; friable when moist; neutral (pH 6.8); clear, wavy boundary. 8 to 10 inches thick.

A2—8 to 12 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; friable when moist; neutral (pH 7.0); clear, wavy boundary. 3 to 4 inches thick.

B21—12 to 18 inches, dark-brown (10YR 4/3) heavy silt loam, thin, medium, platy structure, with tendency to form coarse blocks; friable when moist; neutral (pH 7.2); clear, wavy boundary. 5 to 8 inches thick.

B22—18 to 27 inches, dark-brown (10YR 4/3) heavy silt loam; few, fine, distinct mottles of grayish brown (10YR 5/2) and a few pebbles as much as 3 inches in diameter; medium, coarse, subangular blocky structure;

friable when moist; neutral (pH 7.2); clear, wavy boundary. 7 to 10 inches thick.

B23g—27 to 33 inches, dark grayish-brown (10YR 4/2) gravelly heavy silt loam; common, fine, distinct, grayish-brown (10YR 5/2) and yellowish-red (5YR 4/8) mottles; 40 percent of horizon is gravel as much as 2 inches in diameter; moderate, medium, platy structure breaking to weak, fine, subangular blocky structure; friable when moist; neutral (pH 7.2); abrupt, smooth boundary. 4 to 6 inches thick.

IIC—33 to 45 inches, yellowish-red (5YR 5/8) gravelly clay loam; strong-brown (7.5YR 5/6) and grayish-brown (10YR 5/2) mottles; 80 percent of horizon is coarse fragments; friable when moist, sticky and plastic when wet; neutral (pH 6.8).

Color of the Ap horizon ranges from very dark grayish brown to dark brown. The texture of the B2 horizons ranges from silt loam or heavy silt loam to silty clay loam. Depth to mottling ranges from 18 to 36 inches, but mottling commonly occurs below a depth of about 24 inches. The grade of structure throughout the profile is weak to moderate. Depth to bedrock ranges from 3½ to 6 feet. Reaction ranges from medium acid to neutral.

Lindside silt loam (Lt).—This is the only soil of the Lindside series mapped in Berks County. It is in narrow areas along streams that drain the limestone valley. The profile is the one described as typical for the series. The content of gravel and cobblestones is very high where this soil occurs in or near Oley Valley. Included with this soil in mapping were small areas of well-drained soils along natural levees or in higher areas.

Surface runoff is slow, and little or no erosion takes place, except for stream gouging during floods. Flooding is the major hazard.

This soil is suitable for some crops, but the seasonal high water table is a limitation to growing other crops. Unless drainage is provided, the choice of crops is limited to those that can tolerate a high water table. (Capability unit IIw–2)

Litz Series

Moderately deep, well-drained, gently sloping to steep soils make up the Litz series. These soils have formed in material that weathered from interbedded gray and brown, calcareous shale and impure limestone. They are mainly within areas of shaly soils that lie between the limestone valley and the higher areas in which the soils are underlain by gray shale. The areas in which the Litz soils occur extend from the western end of Berks County, near Stouchsburg, through Reading and beyond Kutztown. Smaller areas of these soils are in the northern part of the county.

In a cultivated soil typical of the Litz series, the plow layer is dark-brown shaly silt loam about 8 inches thick. The subsoil, about 7 inches thick, is strong-brown, friable, medium acid shaly silt loam that has subangular blocky structure. In the substratum, below a depth of about 15 inches, about 75 percent of the soil material consists of fragments of shale, and strong-brown silt loam fills the spaces between fragments. Gray, calcareous shale is at a depth of 22 inches.

Because of the restricted depth to bedrock, the available moisture capacity is low. Natural fertility is moderate to low, and permeability is moderately rapid throughout the profile.

Use of these soils is limited by the low available moisture capacity and the restricted depth to bedrock. Most of the acreage is farmed, but some small areas are in pasture or trees.

Representative profile of Litz shaly silt loam, 8 to 15 percent slopes, moderately eroded, in a cultivated field 2 miles east of Virginville:

Ap—0 to 8 inches, dark-brown (10YR 4/3) shaly silt loam; 30 percent of horizon is coarse fragments; weak, fine, granular structure; friable when moist; strongly acid (pH 5.5); abrupt, smooth boundary. 6 to 8 inches thick.

B2t—8 to 15 inches, strong-brown (7.5YR 5/6) shaly silt loam; 40 percent of horizon is coarse fragments; weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common patches of clay films; medium acid (pH 5.8); clear, wavy boundary. 5 to 8 inches thick.

C—15 to 22 inches, strong-brown (7.5YR 5/6) very shaly silt loam; 75 percent of horizon is coarse fragments; weak, fine, subangular blocky structure modified by shale chips; friable when moist, slightly sticky when wet; medium acid (pH 5.8); gradual, wavy boundary. 3 to 10 inches thick.

R—22 inches +, partly weathered, gray, calcareous shale; many fragments effervesce strongly when dilute hydrochloric acid is added.

The color of the Ap and B2t horizons ranges from brown or dark brown to strong brown or dark yellowish brown. Texture of the B2t horizon ranges from shaly silt loam to shaly clay loam, and the thickness of that horizon ranges from 4 to 9 inches. Depth to hard rock ranges from 20 to 30 inches.

Litz soils occur with deep, well-drained Duffield and with moderately deep, well-drained Ryder and Berks soils. Some areas of Litz soils are within the belt of Berks and Bedington soils that extends across the northern part of the county. Litz soils also occur with moderately well drained Wiltshire soils that are in depressions and in nearly level areas.

Litz shaly silt loam, 3 to 8 percent slopes, moderately eroded (LzB2).—This soil has a profile similar to the one described as typical for the series, except that it is somewhat deeper over bedrock. In most places as much as half the original surface layer has been lost through erosion.

Included with this soil in mapping were small areas of nearly level soils that are not eroded or that are only slightly eroded. Also included were some severely eroded, gently sloping soils.

Slopes, shallowness, and the risk of further erosion are the major limitations to use of this Litz soil for farming. This soil is suited to cultivated crops. (Capability unit IIe–5)

Litz shaly silt loam, 8 to 15 percent slopes, moderately eroded (LzC2).—This soil has the profile described as typical for the series. It is eroded to the extent that tillage has mixed some material from the subsoil with that in the plow layer.

Surface runoff is medium, and the hazard of further erosion is severe. The available moisture capacity is low.

This soil is not well suited to cultivated crops. The slopes, the risk of further erosion, and the restricted depth to bedrock are the major limitations to farm use. (Capability unit IIIe–3)

Litz shaly silt loam, 15 to 25 percent slopes, moderately eroded (LzD2).—The profile of this soil is thinner than the one described as typical for the series. This soil tends to be droughty. Rapid surface runoff makes it highly susceptible to further erosion. Included in map-

ping were small areas of soils that are protected by trees and that are not eroded or are only slightly eroded.

Most areas are used for crops, but the moderately steep slopes make this soil generally unsuited to cultivation. Permanent pasture is a suitable use if the soil is protected from erosion when it is seeded and while it is being grazed. (Capability unit IVe–3)

Litz shaly silt loam, 15 to 30 percent slopes, severely eroded (LzE3).—This soil is steeper than the one for which a profile is described as typical for the series, and it has lost more than three-fourths of its original surface layer through erosion. It is droughty. Runoff is rapid, and the hazard of further erosion is severe.

Strong slopes and the hazard of further erosion make this soil unsuitable for crops. This soil can be used for trees, for recreational areas, or for wildlife habitat. (Capability unit VIIe–2)

Made land, granite and gneiss materials, sloping (MaB).—This miscellaneous land type is nearly level or gently sloping. It consists mainly of materials derived from soils of the Chester, Brandywine, and Glenville series. These materials have been moved or disturbed by excavation or filling so that the natural, orderly arrangement of horizons in the soils has been destroyed. As a result, the soils cannot be classified on the basis of the form and properties of the original layers. The general engineering properties, however, are similar to those of soils in the county that are underlain by granite and gneiss. This land type is generally not suitable for farming.

Properties of the soil material vary from site to site, especially where excavation extended to a point below the depth of the profile described as typical for the series from which the land type originated. Also variable are the amounts and kinds of bedrock or material from the substratum that were included in the fill. The degree of compaction affects the stability of the soil material in this land type and the rate at which water moves through the fill. Each site should be investigated to determine its suitability for the intended use. (Not placed in a capability unit)

Made land, granite and gneiss materials, strongly sloping (MaD).—This miscellaneous land type consists mainly of materials derived from soils of the Chester, Brandywine, and Glenville series. These materials have been moved or disturbed by excavation or filling so that the natural, orderly arrangement of particles and horizons in the soils has been destroyed. As a result, the soils cannot be classified on the basis of the form and properties of the original layers. The general engineering properties, however, are similar to those of soils normally associated with granitic gneiss and similar rocks in this county. This land type is generally not suitable for farming.

Properties of the soil material vary from site to site, especially where excavation extended to a point below the depth of the profile described as typical for the series from which the land type originated. The amounts and kinds of bedrock or material from the substratum included in the fill are also variable. The degree of compaction affects the stability of the soil material and the rate at which water moves through the fill. Each site should be investigated to determine its suitability for the intended use. (Not placed in a capability unit)

Made land, limestone materials, sloping (MdB).—This miscellaneous land type consists mainly of materials derived from soils of the Duffield, Washington, Hagerstown, Fogelsville, and Wiltshire series. These materials have been moved or disturbed by excavation or filling so that the natural, orderly arrangement of particles and horizons has been destroyed. As a result, the soils cannot be classified on the basis of the form and properties of their original layers. The general engineering properties, however, are similar to those of soils underlain by limestone. This land type is generally not suited to farming.

Properties of the soil material vary from site to site, especially where excavation extended to a point below the depth of the profile described as typical for the series from which the land type originated. The amounts and kinds of bedrock or material from the substratum included in the fill are also variable. The degree of compaction affects the stability of the soil material and the rate at which water moves through the fill. Each site should be investigated to determine its suitability for the intended use. (Not placed in a capability unit)

Made land, limestone materials, strongly sloping (MdD).—This miscellaneous land type consists of materials derived from soils of the Duffield, Washington, Hagerstown, Fogelsville, and Wiltshire series. These materials have been moved or disturbed by excavation or filling so that the natural, orderly arrangement of particles and horizons in the soils has been destroyed. As a result, the soils cannot be classified on the basis of the form and properties of the original layers. The general engineering properties, however, are similar to those of soils underlain by limestone. This land type is sloping to steep. It is generally not suited to farming.

Because of differences in the kind of material, properties of the soil material vary from place to place, especially where excavation has extended to a point below the depth of the profile described as typical for the series from which the land type originated. Also variable are the amounts and kinds of bedrock or material from the substratum included in the fill. The degree of compaction affects the stability of the soil material and the rate at which water moves through the fill. Each site should be investigated to determine its suitability for the intended use. (Not placed in a capability unit)

Made land, shale and sandstone materials, sloping (MeB).—This miscellaneous land type consists of materials derived mainly from soils of the Berks, Weikert, Edgemont, Dekalb, and Comly series. These materials have been moved or disturbed by excavation or filling so that the natural, orderly arrangement of the particles and horizons in the soils has been destroyed. As a result, the soils cannot be classified on the basis of the form and properties of the original layers. The general engineering properties, however, are similar to those of soils underlain by shale, sandstone, and quartzite. This land type is generally not suited to farming.

Because of differences in the kind of material, properties of the soil material vary from place to place, especially where excavation extended to a point below the depth of the profile described as typical for the series from which this land type originated. Also variable are

the amounts and kinds of bedrock or material from the substratum included in the fill. The degree of compaction affects the stability of the soil material and the rate at which water moves through the fill. Each site should be investigated to determine its suitability for the intended use. (Not placed in a capability unit)

Melvin Series

The Melvin series consists of soils that are poorly drained and nearly level. These soils have formed in alluvium derived from sediment originating in uplands underlain by limestone and calcareous shale. They are in Oley Valley, and they also occur along streams that drain the limestone valleys in the western, central, and eastern parts of the county.

In a cultivated soil typical of the Melvin series, the surface layer is very dark grayish-brown and dark grayish-brown, mottled silt loam about 11 inches thick. The upper part of the subsoil, extending to a depth of about 22 inches, is grayish-brown, mottled heavy silt loam to silty clay loam. Below a depth of about 22 inches, this material grades to grayish-brown or yellowish-brown, mottled silty clay loam. The substratum is at a depth of about 42 inches. It generally consists of yellowish-brown, mottled silty clay.

Little or no runoff takes place. Therefore, these soils are not subject to erosion or are only slightly subject to erosion, except where stream gouging occurs during floods. The available moisture capacity is high, and permeability is moderately slow throughout the profile. Because the water table is high, these soils are wet most of the year. Also, they are subject to frequent flooding, and water is ponded in low spots and in closed depressions for several days after flooding occurs.

Most of the acreage is in pasture or trees. A few small areas are cultivated.

Representative profile of a nearly level Melvin silt loam in a pasture 2 miles north of Sinking Spring:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) and dark grayish-brown (10YR 4/2) silt loam; common, fine, faint, dark reddish-brown (2.5YR 2/4) mottles; weak, fine, granular and thin platy structure; friable when moist; neutral (pH 7.0); abrupt, smooth boundary. 6 to 8 inches thick.

A2g—8 to 11 inches, grayish-brown (2.5YR 5/2) heavy silt loam; few, fine, distinct, dark grayish-brown (10YR 4/2) mottles and common, fine, distinct, brown (7.5YR 5/4) mottles; weak, fine, blocky structure breaking to thin platy structure; friable when moist, slightly sticky when wet; neutral (pH 7.0); clear, wavy boundary. 2 to 4 inches thick.

B21g—11 to 14 inches, grayish-brown (2.5Y 5/2) heavy silt loam; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, fine and medium, blocky structure; friable when moist, slightly sticky when wet; neutral (pH 6.8); clear, wavy boundary. 2 to 4 inches thick.

IIB22g—14 to 22 inches, grayish-brown (10YR 5/2) silty clay loam; few, fine, faint, brown (10YR 5/3) and yellowish-brown (10YR 5/4) mottles; moderate, fine, blocky structure; firm when moist, sticky and plastic when wet; few thin clay films on ped surfaces; neutral (pH 6.8); gradual, wavy boundary. 6 to 9 inches thick.

IIB23g—22 to 33 inches, grayish-brown (10YR 5/2) silty clay loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, coarse, prismatic structure breaking to moderate, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; few thin clay films on the ped surfaces; neutral (pH 6.8); diffuse, irregular boundary. 9 to 13 inches thick.

IIB24g—33 to 42 inches, yellowish-brown (10YR 5/8) silty clay loam; common, fine, prominent, gray (N 5/0) mottles; moderate, coarse, prismatic structure breaking to moderate, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; slightly acid (pH 6.5); diffuse, wavy boundary. 8 to 12 inches thick.

IIIC—42 to 48 inches +, yellowish-brown (10YR 5/8) silty clay; common, medium, prominent, gray (N 5/0) mottles, moderate, coarse, prismatic structure; firm when moist, sticky and plastic when wet; neutral (pH 6.8).

The color of the A horizons ranges from very dark brown to very dark grayish brown or grayish brown. The soil material is mottled within a few inches of the surface. Texture of the B horizons ranges from heavy silt loam to silty clay loam. The profile contains a small number of pebbles, and it contains fairly thick layers or lenses of gravel in places. Reaction throughout the profile ranges from slightly acid to neutral, depending on the amount of lime that has been applied.

Melvin soils occur in the same general areas as Lindside soils. They are more poorly drained than those soils.

Melvin silt loam (Ml).—This is a level or nearly level soil along streams that drain uplands underlain by limestone. It is the only soil of the Melvin series mapped in this county. The profile is the one described as typical for the series, but it contains pebbles and cobblestones where this soil occurs in Oley Valley.

Included in mapping were small areas of wetter soils that have a black surface layer. Separation of these wet soils on the map was not practical.

Flooding is frequent, and water stands in the depressions for several days. This Melvin soil has a high water table that keeps it wet for long periods of time. Flooding and the high water table are its main limitations to farm use.

This soil is not well suited to cultivated crops. It can be farmed, however, if crops are grown in a rotation of low intensity. Also, the plants that are grown must be chosen for their tolerance to wetness caused by the high water table. Where this soil is drained, it is easier to manage and generally is better suited to crops than where no drainage is provided. (Capacity unit IIIw-2)

Murrill Series

Soils of the Murrill series are deep and well drained. They formed in colluvium derived from granitic gneiss, quartzite, and sandstone. The colluvium overlies buried soils that formed in material weathered from limestone. Where the layer of colluvium is thin, sinkholes are common. The Murrill soils are at the bases of the Reading Hills and South Mountain.

In a cultivated soil typical of the Murrill series, the plow layer is very dark brown gravelly loam about 8 inches thick. The upper part of the subsoil, extending to a depth of about 19 inches, is dark-brown to dark yellowish-brown heavy silt loam to silty clay loam that has blocky or subangular blocky structure. The lower part, extending to a depth of 60 inches, is yellowish-brown to dark-brown or strong-brown silty clay loam to silt loam. The substratum is at a depth of about 60 inches. It con-

sists mainly of reddish-brown coarse sand and fine gravel, but it contains some cobblestones of quartzite and gneiss.

The available moisture capacity and natural fertility are moderate to high. Permeability is moderate.

Except for areas that are eroded or that have strong slopes, Murrill soils are well suited to general farming. Also, favorable depth, a friable subsoil, and slopes that provide good air drainage make them suitable for orchards. These soils are adjacent to soils that are among the best in the county for farming, and they are farmed intensively. Only small areas are in pasture or trees.

Representative profile of Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile southwest of Blandon:

Ap—0 to 8 inches, very dark brown (10YR 2/2) gravelly loam; 25 percent of horizon is coarse fragments; moderate, fine, granular structure; friable when moist; neutral (pH 6.6); abrupt, wavy boundary. 7 to 10 inches thick.

B1—8 to 13 inches, dark-brown (7.5YR 4/4) heavy silt loam; 10 percent of horizon is coarse fragments; weak, fine, subangular blocky structure; friable when moist; medium acid (pH 6.0); gradual, wavy boundary. 4 to 6 inches thick.

B21t—13 to 19 inches, dark-brown (7.5YR 4/4) to strong-brown (7.5YR 4/6) silty clay loam; 5 percent of horizon is coarse fragments; weak, fine, blocky structure; friable when moist, sticky and plastic when wet; common thin clay films on peds and lining the pores; strongly acid (pH 5.5); gradual, wavy boundary. 4 to 7 inches thick.

B22t—19 to 28 inches, strong-brown (7.5YR 5/6) silty clay loam; 10 percent of horizon is coarse fragments; moderate, medium and fine, blocky structure; friable when moist, sticky and plastic when wet; thin clay films on ped surfaces and lining the pores; strongly acid (pH 5.5); gradual, wavy boundary. 7 to 11 inches thick.

B23t—28 to 36 inches, strong-brown (7.5YR 5/6) to yellowish-brown (10YR 5/8) gravelly light silty clay loam; 20 percent of horizon is coarse fragments; weak, medium, blocky structure; firm when moist, slightly sticky and slightly plastic when wet; common clay films on the larger surfaces; strongly acid (pH 5.4); clear, wavy boundary. 4 to 8 inches thick.

B24t—36 to 42 inches, yellowish-brown (10YR 5/6) gravelly silt loam; 20 percent of horizon is coarse fragments; few, medium to coarse, faint, brown (10YR 5/3) mottles; coarse blocky structure breaking to very thin platy structure; firm when moist, slightly sticky and slightly plastic when wet; clay films on the larger ped surfaces; strongly acid (pH 5.4); clear, wavy boundary. 6 to 9 inches thick.

B31—42 to 52 inches, yellowish-brown (10YR 5/6) silt loam; 5 percent of horizon is coarse fragments; massive breaking to thin platy structure; firm when moist, slightly sticky and slightly plastic when wet; thin clay films and fine iron and manganese coatings on the ped surfaces; strongly acid (pH 5.3); gradual, wavy boundary. 8 to 10 inches thick.

B32—52 to 60 inches, strong-brown (7.5YR 5/6) silt loam; 10 percent of horizon is coarse fragments; massive breaking to thin platy structure; firm when moist, slightly sticky and slightly plastic when wet; common thin clay films; iron manganese coatings on some surfaces; medium acid (pH 5.6); gradual, irregular boundary. 5 to 8 inches thick.

IIC—60 to 94 inches, reddish-brown (5YR 4/4) coarse sand; fine gravel grading to cobblestones; mostly white to gray quartzite and little if any gneiss; structureless; loose; 95 percent of horizon is coarse fragments; iron and manganese coatings on pebbles.

The Ap horizon ranges from very dark brown to dark brown in color. The B2t horizons range from dark brown or strong brown to yellowish brown or yellowish red in color and from gravelly silt loam to silty clay loam in texture. Depth to hard rock, which generally is limestone, ranges from 5 to 30 or more feet. Reaction ranges from neutral, in the Ap horizon where the soil has received a large amount of lime, to strongly acid in the B horizons. In many places where these soils are near the bases of slopes, adjacent to Chester and Edgemont soils, they are stony and more gravelly than in other areas.

Murrill soils are near deep, well-drained Hagerstown, Duffield, and Washington soils and are adjacent to deep, well-drained Chester and Edgemont soils. Nearby are moderately well drained Wiltshire soils.

Murrill gravelly clay loam, 0 to 3 percent slopes, severely eroded (MrA3).—The largest areas of this soil are near Blandon where the mushroom industry is concentrated. The plow layer is finer textured than the one in the profile described for the series. In some places the original surface layer has been lost through erosion. In others it has been removed for use in mushroom beds. The surface layer or plow layer now generally consists of material from the upper part of the subsoil, mixed with crop residue and manure. It is finer textured and has a more yellowish color than the normal plow layer of an uneroded Murrill soil.

The major limitations to use for farming are poor tilth and the low content of organic matter, but sinkholes are a limitation in places. Tilth can be improved by plowing under green-manure crops, returning crop residue to the soil, and adding a large amount of manure. (Capability unit IIe–1)

Murrill gravelly loam, 0 to 3 percent slopes (MuA).—This soil is generally close to areas of Duffield, Hagerstown, and Washington soils. Its surface layer is thicker than the one in the profile described as typical for the series. Surface runoff is slow, and the hazard of erosion is slight.

This soil is well suited to the general farm crops commonly grown in the county. Sinkholes are a limitation to use for farming in some places. (Capacity unit I–1)

Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded (MuB2).—This soil is mainly on the lower slopes of the hills, adjacent to the valley. It has the profile described as typical for the series. Included with it in mapping were small areas of severely eroded, steeper soils in areas where surface water has concentrated.

Runoff is slow to medium on this Murrill soil. The hazard of further erosion is moderate.

Most of the acreage is in cultivated crops, but small areas are in pasture or trees. The major needs are controlling surface runoff so that this soil will be protected from further erosion, and maintaining the content of organic matter in the surface layer. (Capability unit IIe–1)

Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded (MuC2).—This soil has a surface layer that is slightly thinner than the one in the profile described as typical for the series. Included in mapping were some small areas of severely eroded soils that have a lighter color and are more clayey than typical for this soil.

Surface runoff is medium. This soil is fairly well suited to farming. Slopes and the hazard of further erosion are the main limitations to use for farming. (Capability unit IIIe–1)

Murrill very stony loam, 0 to 8 percent slopes (MvB).—This soil is generally on the upper parts of slopes, close to areas of Chester and Edgemont soils. Instead of having a dark grayish-brown plow layer like the one in the profile described as typical for the series, it has a thin, very dark brown surface layer underlain by a subsurface layer that is lighter colored. Many stones and boulders are on the surface and in the upper part of the profile. In most places this soil is not eroded, because most of the acreage is wooded. The surface is covered by a layer of leaves and twigs over a mat of black organic matter.

This soil is too stony for crops, but it is suitable for pasture where it has been cleared of trees. Removing the trees and stones so that a new pasture can be established, however, is generally not economically feasible. (Capability unit VIs–1)

Murrill very stony loam, 8 to 25 percent slopes (MvC).—This soil has many stones and boulders on the surface and in the upper part of the profile. Generally, it is on the upper parts of slopes, close to areas of Chester and Edgemont soils. Most of the acreage is in trees, and this soil is not eroded to any extent. Instead of having a dark grayish-brown plow layer like the one in the profile described as typical for the series, this soil has a thin, very dark brown surface layer underlain by a lighter colored subsurface layer. The surface is covered by a layer of leaves and twigs over a mat of black organic matter.

Surface runoff is medium to rapid on this sloping to moderately steep soil. Severe erosion is a hazard if cultivated crops are grown.

This soil is too stony for growing crops, but it is suitable for pasture if the areas are cleared of trees. Removing the trees and stones so that a new pasture can be established, however, generally is not economically feasible. (Capability unit VIs–1)

Neshaminy Series

The Neshaminy series consists of deep, well-drained, gently sloping to steep soils formed in material that weathered from diabase rocks. These soils are mainly in the southern part of the county.

In a cultivated soil typical of the Neshaminy series, the plow layer is reddish-brown silt loam about 8 inches thick. The subsoil is reddish silt loam to silty clay loam. It has subangular blocky and blocky structure and is medium acid in the upper part and strongly acid in the lower part. The lower part of the subsoil contains many fragments of stones.

These soils have high available moisture capacity because of their moderately fine textured subsoil. Natural fertility is high. Permeability throughout the profile is moderate.

Large areas of these soils are in trees or pasture. Smaller areas are idle or are used for crops.

Representative profile of Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded, in a field 1 mile south of Kulptown:

Ap—0 to 8 inches, reddish-brown (5YR 4/3) silt loam; weak, fine, granular structure; friable when moist; medium acid (pH 5.6); abrupt, smooth boundary. 6 to 8 inches thick.

B1—8 to 12 inches, yellowish-red (5YR 4/8) silt loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; few thin clay films; medium acid (pH 5.6); gradual, smooth boundary. 3 to 5 inches thick.

B21t—12 to 28 inches, red (2.5YR 4/8) silty clay loam; moderate, fine, blocky structure; firm when moist, sticky and plastic when wet; thick clay films; strongly acid (pH 5.4); clear, wavy boundary. 14 to 16 inches thick.

B22t—28 to 52 inches, red (2.5YR 4/8) silty clay loam; moderate, medium and coarse, blocky structure; firm when moist, sticky and plastic when wet; thick clay films; strongly acid (pH 5.2); gradual, wavy boundary. 20 to 24 inches thick.

B3—52 to 55 inches +, red (2.5YR 4/8) and yellowish-red (5YR 5/8) silt loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few to many large diabase fragments 6 to 12 inches in diameter; strongly acid (pH 5.4).

The color of the Ap horizon ranges from dark brown to reddish brown or dark reddish brown. The color of the B2 and B3 horizons ranges from red to yellowish red, and the texture of those horizons ranges from silt loam to light silty clay loam or clay loam. Thickness of the solum ranges from 30 inches to 60 inches or more. Depth to bedrock ranges from 4 to 6 feet.

Neshaminy soils are generally surrounded by Brecknock and Lehigh soils. In a few places they are surrounded by Chester and Brandywine soils.

Neshaminy silty clay loam, 8 to 15 percent slopes, severely eroded (NaC3).—This soil has lost most of its original surface layer through erosion, and tillage has mixed a large amount of material from the subsoil with that in the plow layer. This subsoil material makes the plow layer sticky and plastic. The plow layer is low in content of organic matter and is difficult to keep in good tilth.

Much of the water that falls on the surface runs off and is not available to plants. This soil is not well suited to farming. The major limitations to use for farming is the damage from past erosion. (Capability unit IVe–1)

Neshaminy silty clay loam, 15 to 25 percent slopes, severely eroded (NaD3).—Most of the original surface layer of this soil has been lost through erosion, and the present plow layer has a large amount of material from the subsoil mixed with it. As a result, the plow layer is sticky and plastic.

Runoff is rapid, and this soil is highly susceptible to further erosion. Much of the water that falls on the surface runs off and is not available to plants. The moderately steep slopes and the sticky and plastic plow layer make this soil unsuitable for field crops. Many of the areas are used for pasture. (Capability unit VIe–1)

Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded (NeB2.)—This soil has the profile described as typical for the series. It has lost about half of its original surface layer through erosion, and the present surface layer has a somewhat lighter color and a slightly finer texture than the original one.

Included with this soil in mapping were small areas of nearly level soils that are not eroded. Also included were small areas of gently sloping soils that are severely eroded.

Surface runoff is slow. The hazard of further erosion is slight.

This soil has few limitations to use for cultivated crops.

The major limitations to farming are the slopes and the damage from past erosion. (Capability unit IIe–1)

Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded (NeC2).—Erosion has removed as much as half of the original surface layer from this soil. Surface runoff is medium, and the hazard of further erosion is severe.

This soil is generally suitable for cultivated crops. Its major limitations if it is farmed are the slopes and the damage caused by past erosion. (Capability unit IIIe–1)

Neshaminy very stony silt loam, 5 to 25 percent slopes (NsD).—This soil has a large number of stones and boulders on the surface and within the surface layer and subsoil. In a few places, ledges of bedrock are exposed. Most of the acreage is in trees, and a thin layer of leaves and twigs, underlain by a thin layer of mull-type organic matter, covers the surface. The surface layer consists of dark-brown mineral soil material that is underlain by a lighter colored subsurface layer or by the upper part of the subsoil.

Because this soil is mainly in trees, little water runs off the surface and little or no erosion has taken place. Nevertheless, surface runoff ranges from slow to rapid, and the hazard of erosion is moderate to high.

In areas that have been cleared of trees, this soil is suitable for permanent pasture. Clearing the trees and removing the stones, however, so that a new pasture can be established is not economically feasible. (Capability unit VIs–1)

Neshaminy very stony silt loam, 25 to 60 percent slopes (NsF).—This soil is mainly in trees, and little or no erosion has taken place in these wooded areas. In a few places, however, severe erosion has occurred where the cover of trees has been removed and surface water has concentrated. A large number of stones and boulders are on the surface. Also on the surface is a thin layer of leaves and twigs underlain by a thin layer of mull-type organic matter. The surface layer consists of dark-brown mineral soil material that is underlain by the upper part of the subsoil, which is lighter colored than the surface layer.

Surface runoff is rapid or very rapid. This soil is highly susceptible to erosion.

This soil is too steep and stony for farming. It is suitable for trees, for wildlife, or for recreation. (Capability unit VIIs–1)

Penn Series

Soils that are moderately deep, well drained, and gently sloping to moderately steep make up the Penn series. These soils have formed in material that weathered from red shale and sandstone. They are in the southern third of the county in the area underlain by red rocks.

In a cultivated soil typical of the Penn series, the plow layer is dark-brown silt loam about 8 inches thick. The subsoil, between depths of 8 and about 24 inches, is dark reddish-brown to dusky-red shaly silt loam that has subangular blocky or blocky structure. The substratum, between depths of about 24 and about 28 inches, is dusky-red very shaly loam. The subsoil contains many coarse fragments, and about 80 percent of the substratum is coarse fragments.

The Penn soils are low in natural fertility, moderate to low in available moisture capacity, and moderately rapid in permeability. The steeper slopes are susceptible to erosion.

Penn soils are easily tilled. They are generally suited to the crops commonly grown in the county, except where they are too steep or eroded.

Representative profile of Penn shaly silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1.2 miles north of Kulptown:

Ap—0 to 8 inches, dark-brown (7.5YR 4/2) shaly silt loam; 25 percent of horizon is coarse fragments; weak, fine, granular structure; friable when moist; slightly acid (pH 6.4 where lime has been applied); abrupt, smooth boundary. 7 to 9 inches thick.

B1—8 to 12 inches, dark reddish-brown (5YR 3/4) shaly silt loam; 30 percent of horizon is shale fragments; moderate, fine, subangular blocky structure; firm when moist, slightly sticky when wet; thin, discontinuous clay films; strongly acid (pH 5.4); clear, wavy boundary. 3 to 5 inches thick.

B21t—12 to 18 inches, dusky-red (2.5YR 3/2) shaly silt loam; 30 percent of horizon is coarse fragments; moderate, medium, blocky structure; firm when moist, sticky and slightly plastic when wet; common clay films; thin manganese and iron coatings; strongly acid (pH 5.3); gradual, wavy boundary. 5 to 8 inches thick.

B22t—18 to 24 inches, dusky-red (2.5YR 3/2) shaly silt loam; 35 percent of horizon is coarse fragments; moderate, fine, blocky structure; firm when moist, sticky and slightly plastic when wet; thick clay films lining pores; many iron and manganese coatings; strongly acid (pH 5.3); clear, wavy boundary. 6 to 9 inches thick.

C—24 to 28 inches, dusky-red (2.5YR 3/2) very shaly loam; 80 percent of horizon is coarse fragments; structureless; friable when moist; medium acid (pH 5.6); clear, wavy boundary. 3 to 5 inches thick.

R—28 inches +, dusky-red (2.5YR 3/2), soft, red shale.

The color of the Ap horizon ranges from dark brown to dark reddish brown, and the texture of that horizon ranges from loam to shaly silt loam. The B2 horizons range from reddish brown to weak red or dusky red in color and from shaly silty clay loam to shaly loam in texture. Depth to hard, red shale ranges from 2 to 3½ feet.

In places the shale is calcareous and effervesces when dilute hydrochloric acid is added.

Penn soils occur in the same general areas as the deep, well drained Lewisberry; the shallow, well drained Klinesville; the moderately well drained Readington; and the poorly drained Croton soils. In areas where the Penn soils occur near Lewisberry soils, they are sandy and are underlain by red sandstone.

Penn shaly soils, 3 to 8 percent slopes, moderately eroded (PeB2).—These soils have the profile described as typical for the Penn series. Included with them in mapping were minor areas of uneroded soils in wooded areas, and a few small areas of nearly level soils that are slightly or moderately susceptible to erosion.

Surface runoff is slow, and the hazard of further erosion is moderate. The available moisture capacity is moderate to low, and natural fertility is low.

These soils are generally suitable for farming. The major limitation to farm use is the risk of further erosion. (Capability unit IIe–5)

Penn shaly soils, 8 to 15 percent slopes, moderately eroded (PeC2).—These soils have a profile that is slightly thinner than the one described as typical for the series. Also, where they occur near areas of Lewisberry soils, their profile is coarser textured than the one described as

typical, and they are underlain by sandstone or conglomerate instead of by red shale. These Penn soils are strongly sloping and are droughty.

Included with these soils in mapping were small areas of severely eroded soils and other small areas of uneroded soils in wooded areas. Also included were areas of soils that have formed in calcareous material and that are less acid than typical for these soils.

Surface runoff is medium. The hazard of further erosion is severe.

These soils are fairly well suited to farming. Major limitations to farm use are the past erosion and the strong slopes that cause the soils to be susceptible to further erosion. Properly disposing of excess water helps to protect these soils from erosion. (Capability unit IIIe-3)

Penn shaly soils, 15 to 25 percent slopes, moderately eroded (PeD2).—The profile of these soils is somewhat thinner and coarser textured than the one described as typical for the series. These soils are moderately steep.

Included with these soils in mapping were small, wooded areas of soils that are not eroded or that are only slightly eroded; areas of other soils that are severely eroded and that have lost more than three-fourths of their original surface layer through erosion; and areas of still other soils that are steep or very steep. Also included were areas of soils that are underlain by calcareous rocks and that have a higher base status than typical. Other included soils are underlain by sandstone and have a much coarser texture than typical.

Surface runoff is rapid. The hazard of further erosion is severe.

Though these soils are highly susceptible to further erosion, they can be used for crops. The included areas of severely eroded soils, however, are better suited to pasture or trees than to field crops. (Capability unit IVe-3)

Philo Series

The Philo series consists of soils that are deep and moderately well drained. These soils have formed in alluvium derived from sediment originating in uplands underlain by shale and sandstone. They are in depressions in the northern and east-central parts of the county and are also along the flood plains of Tulpehocken, Northkill, and Maiden Creeks and the Schuylkill River.

In a cultivated soil typical of the Philo series, the plow layer is dark yellowish-brown silt loam about 10 inches thick. The subsoil, between a depth of 10 and about 17 inches, is dark-brown, friable silt loam that has subangular blocky structure. Between depths of 17 and 40 inches, the subsoil is dark grayish-brown to grayish-brown, mottled, friable or very friable silt loam that has subangular blocky structure. The substratum, below a depth of 40 inches, is gray, prominently mottled heavy silt loam. In most places the lower part of the profile contains lenses of gravel several inches thick.

Philo soils are subject to overflow late in winter and early in spring. Because they are in depressions, water tends to remain after the floodwaters recede. The available moisture capacity is high, and permeability is moderate. The water table is high during some seasons.

Most of the acreage is in pasture or trees. Some areas are cultivated.

Representative profile of Philo silt loam in a pasture 1 mile north of Berne:

Ap—0 to 10 inches, dark yellowish-brown (10YR 3/4) silt loam; weak, fine, granular and very fine subangular blocky structure; very friable when moist; medium acid (pH 5.7 where lime has been applied); gradual, wavy boundary. 8 to 10 inches thick.

B21—10 to 17 inches, dark-brown (10YR 4/3) silt loam; weak, very fine, subangular blocky structure; friable when moist, slightly sticky when wet; medium acid (pH 5.6); gradual, wavy boundary. 5 to 10 inches thick.

B22—17 to 33 inches, dark grayish-brown (10YR 4/2) light silt loam; common, fine, faint, grayish-brown (10YR 5/2) and very dark grayish-brown (10YR 3/2) mottles; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; medium acid (pH 5.6); gradual, wavy boundary. 12 to 30 inches thick.

B23—33 to 40 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint, dark yellowish-brown (10YR 4/4) mottles; weak, fine, subangular blocky structure; very friable when moist, slightly sticky when wet; thin clay films lining pores; strongly acid (pH 5.5); clear, wavy boundary. 6 to 8 inches thick.

C—40 to 60 inches +, gray (10YR 5/1) heavy silt loam; common, fine, prominent, strong-brown (7.5YR 5/6) mottles; structureless; friable when moist, slightly sticky when wet; strongly acid (pH 5.1).

The color of the Ap horizon ranges from dark yellowish brown to dark grayish brown. The color of the B horizons ranges from dark brown to grayish brown or gray, and the texture of those horizons ranges from heavy silt loam to sandy loam. Lenses of gravel are common. Depth to hard rock ranges from 3½ to 10 feet. Reaction ranges from neutral, where the soils have received lime, to very strongly acid, where no lime has been applied. Where these soils are underlain by sandstone and quartzite, they contain many pebbles and cobblestones.

Philo soils occur with the deep, well-drained Pope and the poorly drained Atkins soils.

Philo loam, coal overwash (Ph).—In Berks County this soil occurs only along the Schuylkill River. In most respects its profile is like the one described as typical for the series, but the surface is covered by 12 to 36 inches of fine, black coal chips that range from the size of coarse sand to the size of fine pebbles. Where these deposits are thickest, operations to recover the coal are taking place on a small scale.

In many places this soil is not suitable for cultivation, because the coarse texture of the surface layer makes the soil material droughty. Also, the black color of the surface layer makes the temperature of the soil high, and a stand of crops is difficult to establish. Where the layer of coal is thin, and where the coal chips are mixed with soil material and organic matter, this soil is fairly well suited to crops, though lime and fertilizer are needed. Only crops that can tolerate a large amount of moisture should be grown. (Capability unit IIw-2)

Philo silt loam (Pl).—This soil has the profile described as typical for the series. It is level or nearly level and is along flood plains of streams in the northern and central parts of the county.

Included with this soil in mapping were small areas of finer textured soils that contain a fragipan. These included soils are nearly as wet as the Philo soil but are on terraces at a slightly higher elevation than the Philo soil.

The available moisture capacity is high, and permeability is moderate. The water table is high in some sea-

sons. Periodic flooding occurs late in winter and early in spring.

This soil is suited to cultivated crops. Only plants that tolerate a high water table should be grown, however, unless surface and subsurface drainage are provided. The areas of included soils that contain a fragipan can be managed in the same way as this soil, but response to drainage practices is poorer than on the Philo soil. (Capability unit IIw–2)

Pope Series

In the Pope series are deep, well-drained, nearly level soils that have formed in alluvial sediments washed from uplands underlain by shale, sandstone, and gneiss. These soils are along streams that drain the northern and east-central parts of the county. They are on natural levees and in similar areas higher than the flood plains.

In a soil typical of the Pope series, the surface layer is very dark grayish-brown silt loam about 4 inches thick. The surface layer is underlain by a subsurface layer of dark-brown loam about 5 inches thick, that, in turn, overlies a layer of brown silt loam about 5 inches thick. The subsoil, between a depth of about 14 and about 30 inches, is brown fine sandy loam that has subangular blocky structure and is slightly acid. In many places it has lenses of gravel in the lower part. The substratum is brown fine sand.

Available moisture capacity is moderate to high, and permeability is moderate to moderately rapid. Natural fertility is moderate to high. Flooding occurs at irregular intervals.

Some areas of these soils are cultivated. Most of the acreage is in pasture.

Representative profile of Pope silt loam in a clearing along the Schuylkill River, 1 mile north of Leesport:

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, very thin, platy structure; very friable when moist; strongly acid (pH 5.4); abrupt, smooth boundary. 2 to 5 inches thick.

A21—4 to 9 inches, dark-brown (7.5YR 4/4) loam; weak, thin, platy structure; strongly acid (pH 5.4); clear, wavy boundary. 3 to 5 inches thick.

A22—9 to 14 inches, brown (7.5YR 4/2) silt loam; massive; friable when moist; medium acid (pH 5.6); gradual, wavy boundary. 3 to 5 inches thick.

IIB2—14 to 30 inches, brown (7.5YR 4/4) fine sandy loam; very weak, medium, subangular blocky structure; friable when moist; slightly acid (pH 6.2); diffuse, wavy boundary. 12 to 16 inches thick.

IIC—30 to 55 inches +, brown (7.5YR 4/4) fine sand; single grain; loose when moist or dry; few thin clay films; strongly acid (pH 5.2). Similar material extends to a depth of about 90 inches.

The color of the A horizons ranges from brown or dark brown to very dark grayish brown and dark yellowish brown. The color of the IIB2 horizon is brown to yellowish brown. The texture of the IIC horizon ranges from silt loam to fine sand. Hard rock is at a depth of 3½ to 10 feet. The number of fragments of stone in the profile ranges from very few in areas underlain by shale to many in areas underlain by sandstone. The Pope soils are generally finer textured and contain fewer stones in areas near the Berks soils than in other places. They are coarser textured and contain more cobblestones and pebbles in areas where Dekalb and Edgemont soils are predominant than in other places.

Pope soils occur with moderately well drained Philo and poorly drained Atkins soils, which are on flood plains.

Pope silt loam (Po).—This nearly level soil has the profile described as typical for the series. It is the only soil of this series mapped in Berks County, and it occupies small areas in the north-central part.

Included with this soil in mapping were small areas of well-drained soils that are on flood plains and that contain considerable amounts of mica and other minerals derived from the weathering of gneiss.

Surface runoff is slow, and the hazard of erosion is only slight, except where stream gouging occurs. The available moisture capacity is moderate to high, and permeability is moderate to moderately rapid. Flooding occurs at irregular intervals.

This soil is suited to most of the crops commonly grown in the county. The areas are generally too small to be managed separately, however, and many of them are farmed with adjoining soils. (Capability unit I–2)

Raritan Series

The Raritan series consists of soils that are moderately well drained and nearly level or gently sloping. These soils have formed in alluvial sediment washed from uplands underlain by red sandstone, conglomerate, and shale. They are on terraces along the Schuylkill River, southeast of Reading.

In a cultivated soil typical of the Raritan series, the plow layer is dark grayish-brown silt loam about 9 inches thick. The upper part of the subsoil, extending to a depth of about 23 inches, is strong-brown silt loam that has subangular blocky structure and has common grayish-brown mottles in the lower part. The lower part of the subsoil is a fragipan consisting of reddish-brown, mottled silt loam. The substratum, at a depth of about 43 inches, is reddish-brown, mottled sandy loam.

Surface runoff is slow, and the hazard of erosion is slight. Permeability is slow throughout much of the profile, and the available moisture capacity is medium. The fragipan and a seasonal high water table retard the penetration of roots and slow the movement of water through the profile.

Raritan soils are used mainly for field crops. Small areas are in trees or pasture.

Representative profile of Raritan silt loam, 0 to 3 percent slopes, in a cultivated field 1 mile southeast of Douglassville:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist; neutral (pH 6.6 where lime has been applied); abrupt, wavy boundary. 7 to 9 inches thick.

B2t—9 to 23 inches, strong-brown (7.5YR 5/6) silt loam; common, fine, distinct, grayish-brown (10YR 5/2) mottles in lower part of the horizon; weak, medium, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; common thick patches of clay films; neutral (pH 6.8); clear, wavy boundary. 12 to 15 inches thick.

Bx1—23 to 43 inches, reddish-brown (5YR 5/3) silt loam; 10 percent of horizon is coarse fragments; common, fine, distinct, strong-brown (7.5YR 5/6), light yellowish-brown (10YR 6/4), yellowish-red (5YR 5/6), and reddish-gray (5YR 5/2) mottles; weak, medium, platy structure; firm to very firm when moist, slightly sticky and slightly plastic when wet; common thick patches of clay films; few iron and manganese coatings; neutral (pH 6.6); clear, wavy boundary. 6 to 10 inches thick.

IIC—43 to 46 inches +, reddish-brown (5YR 4/3) sandy loam; common, fine, distinct, pinkish-gray (5YR 6/2) and dark reddish-gray (5YR 4/2) mottles; weak, medium, platy structure; friable when moist, slightly sticky and nonplastic when wet; very strongly acid (pH 5.0).

The color of the Ap horizon ranges from dark grayish brown to very dark gray. The color of the B horizons ranges from strong brown to reddish brown, and the texture of those horizons ranges from silt loam to silty clay loam or, in a few places, to loam. Texture of the substratum ranges from sandy loam to gravelly loam. The reaction of the solum ranges from neutral to moderately acid, depending on the amount of agricultural lime that has been applied. Thickness of the solum ranges from 36 to 50 or more inches.

Raritan soils occur with the well-drained Birdsboro and the poorly drained Lamington soils. They are not so well drained as the Birdsboro soils and are better drained than the Lamington.

Raritan silt loam, 0 to 5 percent slopes (RaB).—This is the only soil of the Raritan series mapped in this county. It is on terraces along the Schuylkill River, southeast of Reading. The areas extend downstream toward Pottstown, just over the county line in Montgomery County. The profile is the one described as typical for the series.

The available moisture capacity is moderate, and permeability is slow throughout the profile. A fragipan in the subsoil restricts the development of roots and slows the movement of water. The fragipan and a seasonal high water table are the major limitations to use of this soil for farming. This soil is not suited to plants that are sensitive to excess moisture caused by the high water table. (Capability unit IIw-1)

Readington Series

Deep, moderately well drained, nearly level or gently sloping soils are in the Readington series. These soils have formed on uplands under a forest cover of mixed oaks. The material in which they formed was weathered from red sandstone, conglomerate, and shale. These soils are on upland flats, in drainageways, and in seepy areas in the southern and southeastern parts of the county.

In a cultivated soil typical of the Readington series, the plow layer is dark reddish-brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 21 inches, is yellowish-red silt loam to silty clay loam that contains a few coarse fragments and has blocky structure. A well-defined fragipan of yellowish-red, mottled clay loam to dark reddish-brown loam is between depths of 21 and about 44 inches. The substratum, below a depth of 44 inches, is dark reddish-brown and pinkish-gray, massive shaly loam.

The available moisture capacity is moderate. The fragipan is brittle, dense, and slowly permeable to air and water, and the rest of the profile is also slowly permeable. In some seasons the water table is high.

Cultivated crops are grown in some places, but many areas are in pasture or trees, and some are idle. In general, these soils are suitable for crops that can tolerate excess moisture.

Representative profile of Readington silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1½ miles southwest of Gibraltar:

Ap—0 to 8 inches, dark reddish-brown (5YR 3/4) silt loam; weak, medium, granular structure; friable when moist; slightly acid (pH 6.4 where lime has been applied); clear, wavy boundary. 6 to 8 inches thick.

B1—8 to 14 inches, yellowish-red (5YR 4/6) silt loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; medium acid (pH 6.0); clear, wavy boundary. 4 to 6 inches thick.

B2t—14 to 21 inches, yellowish-red (5YR 4/6) silty clay loam; 5 percent of horizon is coarse fragments; moderate, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; common thin clay films; medium acid (pH 5.6); clear, wavy boundary. 7 to 12 inches thick.

Bx1—21 to 30 inches, yellowish-red (5YR 4/6) clay loam; 10 percent of horizon is coarse fragments; many, coarse, distinct, light reddish-brown (5YR 6/3), yellowish-red (5YR 5/8), and strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure, with weak, platy structure in the interiors of the peds; firm when moist, sticky and slightly plastic when wet; thick patches of clay films; medium acid (pH 5.6); gradual, irregular boundary. 4 to 9 inches.

Bx2—30 to 44 inches, dark reddish-brown (2.5YR 3/4) loam; 10 to 15 percent of horizon is coarse fragments; weak, fine, subangular blocky and weak, coarse, prismatic structure breaking to weak, thick, platy structure; firm when moist, slightly sticky and slightly plastic when wet; strongly acid (pH 5.4); clear, wavy boundary. 10 to 14 inches thick.

C—44 to 66 inches, dark reddish-brown (2.5YR 3/4) mixed with pinkish-gray (5YR 6/2) shaly loam; 25 percent of horizon is coarse fragments; massive; friable when moist; medium acid (pH 5.6).

The color of the Ap horizon ranges from dark reddish brown or dark reddish gray to yellowish red. The color of the B horizons ranges from yellowish red or dark yellowish brown to reddish brown or dark reddish brown. The texture of the B horizons is silty clay loam to loam. The content of gravel and fragments of stone in the solum ranges from 0 to 30 percent, and depth to hard rock ranges from 3½ to 6 feet. Reaction in the profile is generally medium acid to slightly acid, except where the soils have been limed, but it ranges to strongly acid in the lower part of the solum.

Readington soils occur with deep, well drained Lewisberry; moderately deep, well drained Penn; shallow, well drained Klinesville; moderately deep, moderately well drained or somewhat poorly drained Reaville; and poorly drained Croton soils. They are also near deep, well-drained Athol soils.

Readington silt loam, 0 to 3 percent slopes (ReA).—The soil has a deeper profile than the one described as typical for the series. Because it is nearly level in many places, it is likely to be saturated for a longer period of time than are sloping Readington soils. The nearly level areas are fairly broad, and little or no erosion caused by surface runoff has taken place.

This soil contains a fragipan that restricts the development of roots and the movement of water through the profile. The available moisture capacity is moderate. A seasonal high water table and the fragipan are the major limitations to use for farming.

This soil can be cultivated. It is suited to plants that tolerate excess moisture. (Capability unit IIw-1)

Readington silt loam, 3 to 8 percent slopes, moderately eroded (ReB2).—This soil has the profile described as typical for the series. It is on the lower parts of slopes, in areas where water accumulates, especially in spring, and causes a high water table.

Included with this soil in mapping were small areas of severely eroded soils that also have slopes of 3 to 8 percent. Other inclusions consist of areas of soils that have

lost nearly all of their original surface layer through erosion and that are moderately susceptible to further erosion.

Surface runoff is slow to medium on this Readington soil, and the hazard of further erosion is slight. A well-defined fragipan in the subsoil restricts the development of roots and slows the movement of water in the profile. The risk of further erosion and the seasonal high water table are the major limitations to farming.

This soil is suitable for cultivated crops if the surface and subsurface water are controlled. More careful management is needed for the included soils than is needed for this soil. (Capability unit IIe-4)

Reaville Series

The Reaville series consists of soils that are moderately deep, moderately well drained or somewhat poorly drained, and nearly level to gently sloping. These soils have formed in material that weathered from red shale, siltstone, and fine-grained sandstone. They are on uplands in the eastern and southeastern parts of the county, north of the Schuylkill River.

In a cultivated soil typical of the Reaville series, the plow layer is dark reddish-gray shaly silt loam about 7 inches thick. The subsoil is reddish-brown shaly silt loam to very shaly silty clay loam that is mottled in the lower part and is about 19 inches thick. The subsoil has subangular blocky or blocky structure and contains coarse fragments that are more numerous in its lower than in its upper part. Soft, red shale that becomes firmer with increasing depth is below a depth of 26 inches.

The available moisture capacity is low or very low, and permeability is slow. The water table is high early in spring. It falls rapidly late in spring, and the soil is droughty late in summer. These characteristics interfere with farming.

Most of the acreage is in crops, though large areas are idle or in pasture. Smaller areas are in trees.

Representative profile of Reaville shaly silt loam, 0 to 3 percent slopes, moderately eroded, in a cultivated field 2 miles south of Stonersville:

Ap—0 to 7 inches, dark reddish-gray (5YR 4/2) shaly silt loam; 20 percent of horizon is shale fragments; moderate, fine, granular structure; friable when moist; slightly acid (pH 6.4 where lime has been applied); abrupt, smooth boundary. 5 to 7 inches thick.

B1—7 to 12 inches, reddish-brown (5YR 4/3) shaly silt loam; 20 percent of horizon is shale fragments; moderate, fine, subangular blocky structure; friable when moist; slightly acid (pH 6.2); clear, wavy boundary. 3 to 6 inches thick.

B21t—12 to 18 inches, reddish-brown (2.5YR 4/4) shaly silty clay loam; 15 percent of horizon is shale fragments; common, medium, distinct, reddish-brown (5YR 5/4) mottles; moderate, medium, blocky structure; firm when moist, sticky and plastic when wet; common thin clay films; medium acid (pH 5.8); clear, wavy boundary. 6 to 9 inches thick.

B22t—18 to 26 inches, reddish-brown (5YR 4/3) very shaly silty clay loam; 50 percent of horizon is coarse fragments; common, fine, faint, reddish-brown (5YR 5/4) and dark reddish-brown (5YR 3/2) mottles; moderate, fine, blocky structure; friable when moist, sticky and plastic when wet; common thick clay films; medium acid (pH 5.8); clear, wavy boundary. 5 to 10 inches thick.

R—26 inches +, partly weathered red shale.

The color of the Ap horizon ranges from dark reddish gray to dark reddish brown, and the texture of that horizon ranges from silt loam to shaly silt loam. Texture of the B horizons ranges from silt loam to very shaly silty clay loam. Depth to hard rock ranges from 20 to 34 inches.

Reaville soils occur with the well-drained, shallow Klinesville; the poorly drained Croton; and the moderately deep or deep, well-drained Penn soils. They are also near areas of deep, well-drained Athol and Lewisberry soils and moderately well drained Readington soils.

Reaville shaly silt loam, 0 to 3 percent slopes, moderately eroded (R1A2).—This soil has the profile described as typical for the series. It has lost as much as half of its original surface layer through erosion, and tillage has mixed some material from the subsoil with that in the plow layer.

Little water runs off the surface. The hazard of further erosion is slight.

Where this soil has been drained, it is suited to most of the crops commonly grown in the county. Where the soil has not been drained, a seasonal high water table limits the choice of plants that can be grown. (Capability unit IIIw-1)

Reaville shaly silt loam, 3 to 8 percent slopes, moderately eroded (R1B2).—The profile of this soil is slightly shallower over bedrock than the one described as typical for the series. Included in mapping were areas of strongly sloping soils that in some places have lost nearly all of their original surface layer through erosion and that are moderately susceptible to further erosion.

Surface runoff is slow, and the hazard of further erosion is only slight. The water table is high in some seasons, and slowly permeable shale is at a moderate depth. The seasonal high water table, past erosion, and the hazard of further erosion are the major limitations to farming.

This soil is suitable for cultivated crops if the surface and subsurface water are controlled. The seasonal high water table, however, limits the kinds of crops that can be grown. The areas of included soils need more careful management than does this soil. (Capability unit IIIw-1)

Rowland Series

In the Rowland series are soils that are deep, moderately well drained, and nearly level. These soils have formed in alluvial sediment washed from uplands underlain by reddish conglomerate, sandstone, and shale. They are on flood plains along Hay Creek and other streams that drain the southern part of the county.

In a cultivated soil typical of the Rowland series, the plow layer is dark reddish-brown silt loam about 10 inches thick. The upper part of the subsoil, between depths of 10 and 26 inches, is reddish-brown, friable loam that has subangular blocky structure and is medium acid. The lower part, between a depth of 26 and 42 inches, is dark-gray, mottled loam that has subangular blocky structure. The substratum is below a depth of 42 inches. About 90 percent of the substratum is gravel, but some coarse sand is mixed with the gravel.

These soils are only slightly susceptible to erosion or are not susceptible. Flooding is a hazard in spring or in summer after intense thunderstorms. Water accumulates on the surface or is ponded for short periods because the soils are in slightly concave areas. The floodwaters deposit

fresh sediment in some places and remove soil material in others. The available moisture capacity is moderate to high, and permeability throughout the profile is moderate to slow. The water table is high in some seasons.

The seasonal high water table limits the kinds of crops that can be grown on the Rowland soils. Only a small acreage is cultivated. The rest is in pasture or trees.

Representative profile of Rowland silt loam in a pasture south of Geigertown:

Ap—0 to 10 inches, dark reddish-brown (5YR 3/4) silt loam; weak, fine, subangular blocky structure; friable when moist; strongly acid (pH 5.4); abrupt, smooth boundary. 8 to 10 inches thick.

B21—10 to 26 inches, reddish-brown (5YR 4/3) loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; medium acid (pH 5.6); gradual, wavy boundary. 14 to 16 inches thick.

B22—26 to 42 inches, dark-gray (5YR 4/1) loam; many, medium, distinct, dark-red (2.5YR 3/6) mottles; weak, coarse, subangular blocky structure; friable when moist; few thin clay films; strongly acid (pH 5.2); gradual, wavy boundary. 14 to 20 inches thick.

IIC—42 to 60 inches, 90 percent of horizon is pebbles as much as 3 inches in diameter, with lenses of coarse sand.

The color of the Ap horizon ranges from dark reddish brown to dark brown. The color of the B horizons ranges from reddish brown in the upper part to yellowish red, brown, or dark gray in the lower part. The texture of the B21 and B22 horizons ranges from silt loam to sandy clay loam or loam. Depth to mottling ranges from 18 to 36 inches, and depth to bedrock ranges from 3½ to 7 feet or more. Reaction ranges from medium acid to strongly acid. Lenses of sand and gravel are common below a depth of 24 inches.

Rowland soils occur on flood plains with the poorly drained Bowmansville soils. Near them are soils of the Penn and Lewisberry series.

Rowland silt loam (Ro).—This is the only soil of the Rowland series mapped in Berks County. It is nearly level and is on flood plains along streams in the southern part of the county. The profile is the one described as typical for the series.

Included with this soil in mapping were small areas of well-drained soils formed in the same kind of material as this soil. These included soils are on high spots or on natural levees along streams.

Surface runoff is slow, and hazard of erosion is slight. The available moisture capacity is moderate to high.

This soil is suitable for cultivation. It should be protected by a cover crop in winter, however, because of the hazard of flooding. (Capability unit IIw-2)

Rubble land (Ru) is a miscellaneous land type consisting of stony and bouldery areas on Blue Mountain, and of areas on ridges in the Reading Hills and South Mountain. The largest tract is at a place called Blue Rocks near the town of Kempton. It is mainly at the foot of Blue Mountain, but it occupies smaller areas just below the crests of the mountain. About 90 percent of the surface is covered with stones or boulders of conglomerate, quartzite, and sandstone.

This land type is so stony and bouldery or ledgy that only a few scattered trees or shrubs grow on it, and none of these plants are of economic importance. Included in mapping, however, were areas of extremely stony soils where the stand of trees is nearly normal in density. Also included were areas of less stony soils in the Schuylkill River gap north of Hamburg. In many places areas of this land type are too steep and rough to be traversed with equipment needed in farming. (Capability unit VIIIs-1)

Ryder Series

The Ryder series consists of moderately deep, well-drained, silty soils that are nearly level to sloping. These soils have formed in material that weathered from cement rock or shaly limestone. They occupy scattered areas along the northern side of the same limestone valley in which Duffield and Washington soils commonly occur. The largest acreage is north of Stouchsburg. Smaller areas are north of Kutztown and in Oley Valley.

In a cultivated soil typical of the Ryder series, the plow layer is brown silt loam about 7 inches thick. The subsoil, between a depth of 7 and 21 inches, is yellowish-brown to light yellowish-brown silty clay loam to silt loam that has blocky or subangular blocky structure and is neutral to slightly acid in reaction. The substratum, below a depth of about 21 inches, is yellowish-brown and strong-brown, medium acid silt loam. Thin-bedded limestone or cement rock is at a depth of about 33 inches.

Surface runoff is slow to medium. The available moisture capacity and permeability are moderate.

The favorable slopes and ease of cultivation allow most areas of these soils to be used for cultivated crops. Small areas are in pasture or trees.

Representative profile of Ryder silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1½ miles north of Stouchsburg, in Marion Township, on the north side of Road R 06025. (This is the location of profile S62 Pa–6–9 (1–5) sampled for laboratory characterization analysis, tables 10 and 11 in the section "Laboratory Determinations."):

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; neutral (pH 6.8); abrupt, wavy boundary. 6 to 9 inches thick.

B21t—7 to 11 inches, yellowish-brown (10YR 5/4) silty clay loam; 5 percent of horizon is shale fragments; weak, very fine, blocky structure; friable when moist, slightly sticky and nonplastic when wet; common thin clay films; neutral (pH 6.6); clear, wavy boundary. 3 to 6 inches thick.

B22t—11 to 17 inches, yellowish-brown (10YR 5/6) silt loam; 5 percent of horizon is shale fragments; moderate, medium, subangular blocky structure; friable when moist; slightly sticky and nonplastic when wet; thick clay films lining pores; thin clay films on peds; neutral (pH 6.6); clear, wavy boundary. 5 to 10 inches thick.

B3—17 to 21 inches, light yellowish-brown (10YR 6/4) silt loam; 5 percent of horizon is coarse fragments; weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thick clay films on the larger surfaces of peds; slightly acid (pH 6.2); clear, irregular boundary. 2 to 6 inches thick.

C—21 to 33 inches, yellowish-brown (10YR 5/4) and strong-brown (7.5YR 5/6) silt loam that is streaked with dark gray (10YR 4/1); 5 percent of horizon is coarse fragments; structure obscures bedding planes; very friable when moist, nonsticky and nonplastic when wet; medium acid (pH 5.6); abrupt, wavy, broken boundary. 10 to 22 inches thick.

R—33 to 43 inches +, very dark gray (N 3/0) and dark gray (N 4/0), thin-bedded limestone or cement rock; effervesces when dilute hydrochloric acid is added.

The subsoil ranges from neutral to slightly acid in reaction. About 10 percent of the subsoil and from 5 to 20 percent

of the substratum is shale fragments. Depth to bedrock ranges from 2 to 3½ feet.

Ryder soils occur with deep, well drained Fogelsville and moderately well drained Wiltshire soils. They are also near Berks, Duffield, and Washington soils.

Ryder silt loam, 0 to 3 percent slopes, moderately eroded (RyA2).—The surface layer of this soil is thicker than the one in the profile described as typical for the series, and the subsoil is also thicker.

Surface runoff is slow, and there is little or no hazard of erosion. Permeability and the available moisture capacity are moderate.

This soil is suitable for most of the crops grown in the county, though frost heaving sometimes occurs. The moderate depth over bedrock is a limitation to some uses. (Capability unit IIs–2)

Ryder silt loam, 3 to 8 percent slopes, moderately eroded (RyB2).—This soil has the profile described as typical for the series. It has lost part of its surface layer through erosion. Included in mapping were some small areas that have lost more than three-fourths of their original surface layer through erosion.

Surface runoff is slow, and the hazard of further erosion is slight to moderate. Permeability and the available moisture capacity are moderate.

This soil is suitable for cultivated crops. The moderate depth to bedrock is a limitation to some uses. (Capability unit IIe–5)

Ryder silt loam, 8 to 15 percent slopes, severely eroded (RyC3).—This soil has lost more than three-fourths of its original surface layer through erosion, and tillage has mixed much material from the subsoil with that in the plow layer. The profile is somewhat thinner than the one described as typical for the series.

Included with this soil in mapping were areas of moderately steep Ryder soils. In the included areas, runoff is rapid and erosion has occurred in varying degrees.

Runoff is medium on this sloping Ryder soil, and the hazard of further erosion is moderate to high. The available moisture capacity is moderate to high.

This soil is suited to cultivated crops, but the slopes and past erosion limit the intensity of the cropping system that can be used. Slope and moderate depth to bedrock are the major limitations to nonfarm uses. (Capability unit IVe–3)

Washington Series

The Washington series consists of soils that are deep, well drained, and nearly level to strongly sloping. These soils have formed in glacial till or in frost-churned material derived largely from limestone. They are mostly in the western end of the valley between Kutztown and Allentown (in Lehigh County). A few sinkholes characterize the areas.

In a cultivated soil typical of the Washington series, the plow layer is dark-brown silt loam about 8 inches thick. The subsoil, at a depth between 8 and 42 inches, is silty clay loam that is brown in the upper part and strong brown in the lower part. The subsoil has many black coatings of iron and managanese in the lower part and contains coarse fragments. The substratum is below a depth of 48 inches and consists of strong-brown, slightly acid gravelly silt loam that has thin platy structure. It extends below a depth of 57 inches.

The available moisture capacity is moderate to high, and permeability is moderate to moderately rapid. Natural fertility is high.

Washington soils are among the best in the county for farming, and they are used intensively for that purpose. Most of the acreage is in field crops. Small areas are in pasture, however, and a few areas are wooded.

Representative profile of Washington silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1½ miles south of Kutztown:

Ap—0 to 8 inches, dark-brown (10YR 3/3) silt loam; 5 percent of horizon is coarse fragments; fine granular structure; friable when moist; neutral (pH 6.9 where lime has been applied); abrupt, smooth boundary. 8 to 10 inches thick.

B21t 8 to 12 inches, brown (10YR 5/3) silty clay loam; 5 percent of horizon is coarse fragments; moderate, medium, platy and fine subangular blocky structure; firm when moist, slightly sticky when wet; thick patches of clay films; neutral (pH 6.8); clear, wavy boundary. 3 to 5 inches thick.

B22t—12 to 21 inches, brown (7.5YR 5/4) silty clay loam; 10 percent of horizon is coarse fragments; moderate, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; thick clay films on ped surfaces and lining pores; few iron and manganese coatings; neutral (pH 6.8); gradual, wavy boundary. 8 to 12 inches thick.

B23t—21 to 42 inches, strong-brown (7.5YR 5/6) silty clay loam; 15 percent of horizon is coarse fragments; moderate, coarse, blocky structure; firm when moist, sticky and plastic when wet; thick clay films on ped surfaces; common iron and manganese coatings; neutral (pH 6.7); gradual, wavy boundary. 18 to 24 inches thick.

B3—42 to 48 inches, strong-brown (7.5YR 5/8) silt loam; 15 percent of horizon is coarse fragments; weak, fine, blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common manganese and iron coatings; slightly acid (pH 6.2); gradual, wavy boundary. 4 to 10 inches thick.

C—48 to 57 inches +, strong-brown (7.5YR 5/8) gravelly silt loam; 20 percent of horizon is coarse fragments; weak, thin, platy structure; friable when moist, slightly sticky when wet; few thin clay films; slightly acid (pH 6.2); gradual, wavy boundary.

The color of the Ap horizon ranges from very dark brown to dark brown or dark yellowish brown. The color of the B horizons ranges from brown and strong brown to reddish yellow and yellowish red. The texture of the B2 horizons ranges from silt loam to silty clay loam. Depth to hard, gray limestone ranges from 4 to 10 feet or more. The amount of coarse fragments in the solum ranges from 5 to 30 percent.

Washington soils occur with deep, well-drained Duffield, Fogelsville, Hagerstown, and Murrill soils. They also are near moderately well drained Wiltshire and poorly drained Burgin soils. Washington soils are similar to the Duffield in color and texture. In most places they are deeper over bedrock, however, and they contain many cobblestones, pebbles, and other foreign material. These were introduced into the soil by periglacial frost churning or by the movement of glacial water or local ice, which is closely related to the frost churning.

Washington silt loam, 0 to 3 percent slopes, moderately eroded (WaA2).—This soil has a slightly thicker surface layer than the one in the profile described as typical for the series. Also, its entire profile is somewhat thicker than the one described. As much as half of the original surface layer has been lost through erosion.

Included in mapping were small areas of nearly level soils that have lost little or no soil material through erosion. Also included were a few areas where additional

material has accumulated in the surface layer since farming was started.

Further erosion is not a hazard or is only a slight hazard. The available moisture capacity is moderate to high, and natural fertility is high.

This soil is among the best in the county for crops. Loss of soil material through past erosion is the main limitation to farming. Sinkholes are a limitation in places. (Capability unit I-1)

Washington silt loam, 3 to 8 percent slopes, moderately eroded (WaB2).—This soil has the profile described as typical for the series. It has lost as much as half of its original surface layer through erosion. As a result, it is somewhat more difficult to work into a good seedbed and to keep in good tilth than before it was eroded. Included with this soil in mapping were small areas of severely eroded soils and small areas of a Washington soil that is not eroded.

Runoff is slow to moderate, and the hazard of further erosion is slight to moderate. Natural fertility is high, and the available moisture capacity is moderate to high.

This soil is well suited to cultivated crops. The major limitation to use for farming is the hazard of further erosion, but sinkholes are also a limitation in places. (Capability unit IIe-1)

Washington silt loam, 8 to 15 percent slopes, moderately eroded (WaC2).—This soil has lost as much as half of its original surface layer through erosion, and tillage has mixed material from the subsoil with that in the plow layer. The present surface layer has a lighter color and a finer texture than the original one.

Included with this soil in mapping were small areas of severely eroded soils that need to be kept in grass for long periods of time. Also included were small areas of a Washington soil that is not eroded.

Surface runoff is medium, and the hazard of further erosion is moderate to severe. The available moisture capacity is moderate to high. Permeability is moderate to moderately rapid.

The hazard of further erosion is the major limitation to use of this soil for farming. The slopes are a limitation to some uses. (Capability unit IIIe-1)

Watson Series

In the Watson series are moderately well drained, nearly level soils that formed in material weathered from shale, quartzite, and sandstone. In Berks County these soils are deep over shale bedrock. They are on old terraces along the Schuylkill River near Shoemakersville.

In a cultivated soil typical of the Watson series, the plow layer is dark-brown silt loam about 9 inches thick. The upper part of the subsoil, extending to a depth of 13 inches, is yellowish-brown, firm silty clay loam that contains coarse fragments and has subangular blocky structure. In a few places, the subsoil is mottled. A fragipan, extending from a depth of 13 to about 42 inches, is strong-brown, mottled, very firm clay loam that contains coarse fragments. Below the fragipan is yellowish-brown, mottled clay loam that contains many pebbles and a few cobblestones.

The slowly permeable fragipan, which is a prominent feature in the lower part of the subsoil, slows the movement of water through the profile, causes a seasonal high water table, and restricts the development of roots. The available moisture capacity is moderate to low, and permeability is slow throughout the profile.

Most of the acreage is in field crops or pasture.

Representative profile of Watson silt loam, 0 to 3 percent slopes, in a cultivated field one-half mile north of Shoemakersville:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; 5 percent of horizon is coarse fragments; moderate, medium, granular structure; friable when moist; neutral (pH 6.6 where lime has been applied); abrupt, smooth boundary. 7 to 9 inches thick.

B2t—9 to 13 inches, yellowish-brown (10YR 5/6) silty clay loam; few strong-brown (7.5YR 5/6) coatings on peds; 10 percent of horizon is coarse fragments; moderate, medium, subangular blocky structure; firm when moist, slightly sticky when wet; thick patches of clay films; slightly acid (pH 6.2); abrupt, smooth boundary. 10 to 15 inches thick.

Bx1—13 to 30 inches, strong-brown (7.5YR 5/6) clay loam; 15 percent of horizon is coarse fragments; many, coarse, distinct, pale-brown (10YR 6/3) and yellowish-red (5YR 5/6) mottles; weak, coarse, prismatic structure breaking to weak, coarse, blocky structure; very firm when moist, slightly sticky when wet; thick patches of clay films; common iron and manganese coatings; strongly acid (pH 5.4); clear, smooth boundary. 15 to 17 inches thick.

Bx2—30 to 42 inches, strong-brown (7.5YR 5/6) clay loam; 10 percent of horizon is coarse fragments; moderate, medium, distinct, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/6) mottles; weak, very coarse, prismatic structure breaking to moderate, coarse, blocky structure; very firm when moist, slightly sticky when wet; thick patches of clay films; abundant iron and manganese coatings; strongly acid (pH 5.4); clear, smooth boundary. 10 to 12 inches thick.

B3—42 to 57 inches +, yellowish-brown (10YR 6/5) clay loam; 10 percent of horizon is coarse fragments; distinct, strong-brown (7.5YR 5/6) and light brownish-gray (10YR 6/2) mottles; weak, medium and coarse, blocky structure; friable when moist; strongly acid (pH 5.4).

The color of the Ap horizon ranges from dark grayish brown to dark brown, and the color of the B horizons ranges from strong brown to yellowish brown or yellowish red. Texture of the B horizons ranges from silt loam to silty clay loam. Mottling is below a depth of 12 to 24 inches, and mottling of low chroma begins below a depth of 24 inches. Depth to the fragipan ranges from 13 to 24 inches, and depth to hard rock ranges from 4 to 40 feet. The content of coarse fragments in the profile ranges from 5 to 20 percent. The coarse fragments are mainly water-rounded pebbles and cobblestones.

Watson soils occur with Allenwood soils, also on terraces, and they are near Berks, Weikert, and Comly soils, on the adjacent uplands. Below the Watson soils are the Atkins and Philo soils, which are adjacent to the river.

Watson silt loam, 0 to 3 percent slopes (WcA).—This soil has the profile described as typical for the series. It is the only soil of the Watson series mapped in this county.

Surface runoff is slow, and the hazard of erosion is slight. The available moisture capacity is moderate to low, and permeability is slow. A seasonal high water table, however, limits the choice of plants and the ability to manage this soil in some seasons.

This soil is suited to cultivated crops that can tolerate excess moisture caused by the high water table. Drainage would make management easier and would make this soil more suitable for cultivated crops. The main limitations to farming are the slowly permeable fragipan in

the subsoil and the seasonal high water table. (Capability unit IIw-1)

Weikert Series

The Weikert series consists of well-drained, gently sloping to very steep soils that have formed in material weathered from noncalcareous gray shale, siltstone, and fine-grained sandstone. These soils are shallow over bedrock. They are in the north central part of the county.

In a cultivated soil typical of the Weikert series, the plow layer is very dark grayish-brown shaly silt loam that contains many coarse fragments and is about 8 inches thick. The subsoil is yellowish-brown very shaly silt loam about 7 inches thick. A large part of it consists of coarse fragments. The substratum, at a depth between 15 and 19 inches, consists of strong-brown, silty soil material between fragments of shale that make up 70 to 90 percent of the horizon. Most of the fragments of shale are soft enough that they can be broken by hand. The material in the substratum grades to fractured shale bedrock at a depth of about 19 inches. The fractured shale bedrock becomes firmer with increasing depth and grades to hard, blue-black shale at a depth of about 6 feet.

Runoff is slow to medium. The available moisture capacity is low or very low, and permeability is rapid to moderately rapid throughout the profile. Bedrock near the surface, and the high content of coarse fragments, tend to make these soils droughty.

Weikert soils are used mostly for cultivated crops, but fairly large areas are in pasture or trees. These soils are only fairly well suited to crops, and the steep areas are generally not suitable for that purpose.

Representative profile of Weikert shaly silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile east of Strausstown:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) shaly silt loam; 40 percent of horizon is coarse fragments; weak, fine, granular structure; friable when moist; slightly acid (pH 6.2 where lime has been applied); abrupt, wavy boundary. 6 to 8 inches thick.

B2—8 to 15 inches, yellowish-brown (10YR 5/4) very shaly silt loam; 60 percent of horizon is coarse fragments; weak, fine, subangular blocky structure modified by shale chips; medium acid (pH 5.6); gradual, wavy boundary. 6 to 9 inches thick.

C—15 to 19 inches, strong-brown (7.5YR 5/6) silty deposits on and between the shale chips; 90 percent of horizon is shale fragments; medium acid (pH 5.6); gradual, wavy boundary. 3 to 5 inches thick.

R—19 inches +, olive-gray (5Y 5/2), partly weathered shale where the cut surface is exposed; dark-brown (7.5YR 4/4) silt films along bedding planes; strongly acid (pH 5.4).

Color of the Ap horizon ranges from very dark grayish brown to yellowish brown. Color of the B2 horizon ranges from strong brown to yellowish brown. The content of coarse fragments in the solum ranges from 50 to 75 percent, by volume. In general, depth to hard rock is only 10 to 20 inches. In large areas in the western part of the county, the shale bedrock has been fractured and frost churned and has, as a result, an open substratum that roots can penetrate.

Weikert soils occur with the moderately deep, well drained Berks; the deep, well drained Bedington; the moderately well drained Comly; and the poorly drained Brinkerton soils.

Weikert-Berks shaly silt loams, 3 to 8 percent slopes, moderately eroded (WeB2).—In Berks County Weikert soils occur in such an intricate pattern with Berks soils that it was not practical to map or to manage these soils separately. Therefore, these soils were mapped together as soil complexes. These soils are extensive in the northern half of the county and in one concentrated area in Oley Valley. In the northern half of the county, most of the areas are adjacent to areas of Berks shaly silt loams or to areas of Bedington shaly silt loams. In some places in Oley Valley, they are near areas of Ryder silt loams.

Weikert soils generally make up 50 to 60 percent of the complex, but the proportion of Weikert and Berks soils varies, depending on the length and the steepness of the slopes. The proportion of Weikert soils is highest in areas where the slopes are the steepest and most eroded, and the proportion of Berks soils is highest in the gently sloping areas.

The Weikert soils have the profile described as typical for the Weikert series, and the Berks soils have the profile described as typical for the Berks series. These soils are slightly deeper over bedrock than those that have steeper slopes. Both the Weikert and Berks soils have an appreciable amount of gray, olive, and brown shaly material throughout the profile, but bedrock underlying the Weikert soils is at a depth of 10 to 20 inches, and that underlying the Berks soils is at a depth of 20 to 36 inches. For this reason, the Berks soils hold slightly more moisture available to plants and have a deeper root zone than the Weikert soils.

Included with these soils in mapping were small areas of soils that are in pasture or trees and that are only slightly eroded. Also included were small areas of severely eroded soils that have lost more than three-fourths of their original surface layer through erosion.

Surface runoff is slow to medium on the soils of this complex, and the hazard of further erosion is slight to moderate. The available moisture capacity and natural fertility are low. Percolation through the profile is rapid.

The losses of soil material through erosion, and droughtiness, limit the use of these soils for cultivated crops. Careful management is necessary. (Capability unit IIe-5)

Weikert-Berks shaly silt loams, 8 to 15 percent slopes, moderately eroded (WeC2).—The soils of this complex are slightly deeper over bedrock than steeper Weikert and Berks soils. They are sloping and are moderately eroded.

Included with these soils in mapping were small areas of soils that are not eroded and that are in pasture or trees. Also included were small areas of severly eroded soils that have lost more than three-fourths of their original surface layer through erosion.

Runoff is medium to rapid, and the hazard of further erosion is moderate to high. Available moisture capacity and natural fertility are low. The rate of percolation through the profile is rapid.

The low available moisture capacity and losses of material from the surface layer limit the use of these soils for farming. (Capability unit IIIe-4)

Weikert-Berks shaly silt loams, 15 to 25 percent slopes, moderately eroded (WeD2).—The soils of this complex have a profile that is slightly shallower over bedrock than the ones described as typical for the Weikert and Berks series. They are moderately steep.

Included with these soils in mapping were some small uneroded areas of soils in trees or pasture. Also included were some areas of severely eroded soils that have lost more than three-fourths of their original layer through erosion.

Surface runoff is rapid, and the hazard of further erosion is high. Available moisture capacity is low or very low, and natural fertility is low. Percolation through the profile is rapid.

The losses of soil material from the surface layer, and the low available moisture capacity, limit the use of the soils of this complex for farming. The soils are suitable for long-term hay or pasture, for trees, or for recreational uses. (Capability unit VIe–2)

Weikert-Berks shaly silt loams, 25 to 60 percent slopes, moderately eroded (WeF2).—The profiles of the soils of this complex are shallower than the ones described as typical for the Weikert and Berks series. These soils are steep.

Included with these soils in mapping were some small uneroded wooded areas. Also included were areas of severely eroded soils that have lost more than three-fourths of their original surface layer through erosion.

Surface runoff is rapid or very rapid, and the hazard of further erosion is very high. The available moisture capacity is low or very low, and natural fertility is low. Percolation through the profile is rapid.

The soils of this complex are so steep, shallow, and droughty that they are suitable mainly only for pasture or trees. They are not suited to cultivated crops. (Capability unit VIIe–2)

Wiltshire Series

The Wiltshire series consists of deep, nearly level, moderately well drained soils that have formed in material from limestone and calcareous shale. These soils are in depressions and in broad, flat drainageways and other nearly level spots. They are in the area underlain by limestone that extends from Stouchsburg, in the western part of the county, through Reading, in the central part, and beyond Kutztown, in the eastern part. These soils are also in Oley Valley.

In a cultivated soil typical of the Wiltshire series, the plow layer is dark-brown silt loam about 9 inches thick. Where these soils have been farmed, the plow layer has a darker color than the subsoil. The subsoil extends to a depth of 60 inches. Its color is yellowish brown to strong brown, and its texture grades from silt loam to shaly silty clay loam with increasing depth. Spots and streaks of yellowish red and grayish brown below a depth of 20 inches indicate that water stands in these soils for moderate lengths of time. A fragipan of strong-brown, mottled silt loam is between a depth of 41 and 60 inches. This layer is firm and has prismatic and platy structure. The substratum of very shaly loam is at a depth of 60 inches. It contains many fragments of sandstone, limestone, and shale.

Surface runoff is slow to medium, and the hazard of erosion is slight to moderate. The available moisture capacity is moderate to high, and permeability is slow throughout the profile. In some seasons the water table is high because of the slowly permeable fragipan in the subsoil.

In the many places where these soils are in drainageways, ponding occurs during or after heavy rains in summer and after the snow melts in winter.

Representative profile of Wiltshire silt loam, 0 to 3 percent slopes, in a cultivated field 1 mile northwest of Temple:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, medium, granular structure; friable when moist; slightly acid (pH 6.4 where lime has been applied); clear, wavy boundary. 6 to 10 inches thick.

B1—9 to 20 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; slightly acid (pH 6.4); clear, wavy boundary. 10 to 12 inches thick.

B21t—20 to 30 inches, yellowish-brown (10YR 5/6) silt loam; common, medium, distinct, yellowish-red (5YR 4/6), grayish-brown (10YR 5/2), and yellowish-brown (10YR 5/4) mottles; weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; slightly acid (pH 6.4); common thin clay films; common coatings of manganese and iron; gradual, irregular boundary. 5 to 11 inches thick.

B22t—30 to 41 inches, yellowish-brown (10YR 5/6) shaly silty clay loam; 20 percent of horizon is shale fragments; common, medium, distinct, yellowish-red (5YR 4/6) and grayish-brown (10YR 5/2) mottles; moderate, coarse, subangular blocky structure; friable when moist, sticky and plastic when wet; thick patches of clay films; neutral (pH 6.6); gradual, irregular boundary. 8 to 13 inches thick.

Bx—41 to 60 inches, strong-brown (7.5YR 4/6) shaly silt loam; 40 percent of horizon is shale fragments; many, medium, distinct, light brownish-gray (10YR 6/2) and yellowish-red (5YR 4/6) mottles; moderate, coarse, prismatic structure breaking to weak, thick, platy structure; firm when moist, sticky and plastic when wet; thick patches of clay films; neutral (pH 6.6); gradual, irregular boundary. 16 to 22 inches thick.

C—60 inches +, dark-brown (7.5YR 4/4) very shaly loam; 80 percent of horizon is coarse fragments of shale, limestone, and soft sandstone up to 5 inches in diameter.

The color of the Ap horizon ranges from dark brown to grayish brown, and the color of the B horizons ranges from yellowish brown to strong brown. In most places all of the solum below a depth of 20 inches is mottled. Depth to hard rock ranges from 3½ to 8 feet or more. Reaction ranges from slightly acid to neutral, depending on the amount of lime that has been applied to the adjacent soils.

Wiltshire soils are near the well-drained Duffield, Fogelsville, Hagerstown, Washington, and Ryder soils. In most places they are adjacent to areas of poorly drained Burgin soils.

Wiltshire silt loam, 0 to 3 percent slopes (WsA).—This soil has the profile described as typical for the series. In many places it is in broad drainageways where water flows over the surface after snow melts in spring and after heavy rains in summer. Ponding is common in some areas.

Surface runoff is slow to medium, and the hazard of erosion is slight. Available moisture capacity is moderate to high, and permeability throughout the profile is slow. In some seasons the water table is high.

The major limitation to use of this soil for farming is a seasonal high water table, which limits the choice of plants that can be grown. Plants that do not tolerate excess moisture caused by the high water table are likely to be heaved out in winter or drowned in spring. (Capability unit IIw–1)

Wiltshire silt loam, 3 to 8 percent slopes, moderately eroded (WsB2).—This soil has lost as much as half of its

original surface layer through erosion. Tillage has mixed some material from the subsoil with that in the plow layer. As a result, the present plow layer has a lighter color and a slightly finer texture than the original surface layer.

Surface runoff is slow to medium. The hazard of further erosion is slight to moderate.

The erosion hazard and the seasonal high water table are the major limitations to growing cultivated crops. Plants that do not tolerate excess moisture caused by the high water table are likely to be heaved out in winter or drowned in spring. (Capability unit IIe-3)

Formation and Classification of Soils

This section of the soil survey discusses the formation and classification of the soils in Berks County. The first part tells how the soils have formed, describes processes of soil formation, and discusses the soil profile. The second part classifies the soils according to the current system of classification.

Formation of Soils

Soils are complex mixtures of weathered rocks, minerals, organic matter, water, and air that occur in varying proportions. They were formed through the chemical and physical weathering of geologic materials. The extent of the weathering and the characteristics of any soil that develops depend on (1) the nature of the parent rock, (2) the kind of climate, (3) the relief, or lay of the land, (4) the plant and animal life in and on the soil, and (5) the length of time these factors have affected development.

Factors of soil formation

In a small area like Berks County, where vegetation, time, and climate vary but little, the nature of the parent rock produces more differences in texture and mineral content than most of the other soil-forming factors. Climate influences the nature and extent of the weathering processes. Relief affects drainage, aeration, runoff, erosion, and exposure to sun and wind. Plant and animal life influence soil characteristics by both physical and chemical removals and additions. Finally, time is required for the other soil-forming factors to exert their influence. Long periods of time are necessary for changes in soils to become apparent. Nevertheless, soils are slowly but constantly changing.

Parent material.—The soils of Berks County have formed primarily in material weathered from shale, siltstone, sandstone, gneiss, and limestone. Calcareous shale and limestone have weathered to form the parent material of the Duffield, Hagerstown, Litz, Wiltshire, and Burgin soils. Acid siltstone, sandstone, and shale have weathered to form the parent material of the Weikert, Berks, and Comly soils.

Acid sandstone, quartzite, conglomerate, and gneiss have weathered to form the parent material of the Dekalb and Edgemont soils. Because their parent material was coarse-grained sandstone, the Dekalb soils have a high content of sand. Penn soils have formed in material weathered from weakly calcareous red shale and sandstone. The red color of these soils is inherited from the material derived from the red shale.

Sediment deposited on terraces and flood plains of streams is the parent material of the Birdsboro, Philo, Atkins, Melvin, and Lindside soils. The characteristics of these soils depend upon the texture and other characteristics of the alluvial material.

Climate.—The climate of this county is of the humid-temperate, continental type characteristic of the Middle Atlantic States. Some characteristics of the soil profiles indicate that this kind of climate prevailed during the time when the soils were forming, and that it influenced soil development. Most of the soils are acid and strongly leached.

The effect of climate on the formation of soils has been nearly uniform throughout the county. The development of some soils, however, may have been influenced by a microclimate caused by differences in relief.

Relief.—To a large extent relief depends on the nature of the underlying rock. The highest ridges in the landscape, those occupied by the Dekalb soils for example, occur where the rocks are most resistant to weathering. Relief affects surface runoff, and runoff, in turn, affects the soils over which it flows. Water from runoff also enters streams that play a part in causing erosion and in dissecting areas of soils. Furthermore, in areas of sloping or hilly relief, runoff and gravity cause soil material to wash or fall from the side slopes and to accumulate at the base of the slopes. Accumulated material at the base of slopes comprises an important part of the material in which the Laidig. Brinkerton, and Buchanan soils have formed.

Plant and animal life.—Hardwood trees have apparently had more effect on the formation of the soils of Berks County than other kinds of plants. Forests of hardwoods originally covered most of the county. The trees were mainly of the oak-hickory type, but forests of sugar maple, beech, and yellow birch occupied less extensive areas. Hemlocks and pines also grew in small areas that were at higher elevations than the rest of the county. The sites where they grew were cooler and wetter than most sites at lower elevations.

The soils are typical of those developed under forest. Where they have not been disturbed, a layer of leaf litter, underlain by a black O2 horizon 1 inch to 3 inches thick, covers the surface. The O2 horizon is commonly underlain, in turn, by a dark A1 horizon that is 1 to 2 inches thick. Beneath the A1 horizon is a light-colored A2 horizon, several inches thick, similar to the one in the profile described as typical for the Edgemont series.

When the forests were cleared and the soils were farmed, the layers of organic matter were incorporated into the plow layer or were burned. Thus, in many places the soils were left open to wind and rain that produced accelerated erosion.

Since the soils were first cleared, man, through such practices as cultivation, artificial drainage, manuring, and maintenance of perennial grasses and legumes, has had a major effect on the soils. This effect will continue to be felt.

Time.—The length of time the other factors of soil formation have operated is indicated, to some extent, by

the degree of development of the soil profile. Some soils, especially those formed in alluvium, show little profile development because the soil material has not been in place long enough for distinct horizons to have had time to form. Examples of soils that have formed in alluvium are the Philo, Atkins, Melvin, and Lindside. These soils show little development of horizons because they are continually receiving fresh material that is deposited on the surface. They are said to be young, or recent, soils.

The profile development of the Weikert, Klinesville, and Birdsboro soils shows that some changes have taken place in the parent material. These changes, however, do not represent the effects of advanced weathering. Weathering and the development of the soil profile of those soils has been slowed by the effects of relief and by the kind of parent material.

The Bedington, Laidig, Allenwood, and Neshaminy series are made up of soils that have well-developed profiles. In those soils the parent material has been in place for a period of time long enough that distinct horizons have had time to develop.

Processes of soil formation

As weathering proceeds and plants grow on a young soil, several processes are apparent that tend to cause layers, or horizons, to develop in the soil (*18*). As an example, soils gain material when leaves and plant remains accumulate on their surface. This accumulation is easily seen in areas of Dekalb, Edgemont, and other soils that have formed under forest and that have not been plowed. Additions of organic matter, chemical elements, and mineral material are also brought in from adjacent areas by animals, floodwaters, and wind, or they are transferred as the result of gravity.

Losses from the soils occur when minerals decompose and part of the products of weathering are leached from the soils in solution. This process is apparent in the Duffield and Fogelsville soils from which calcium carbonate has been lost. Losses also occur when plant nutrients are removed in harvested plants. In addition, fine particles of soil material are removed by erosion, and gases escape as organic matter decomposes.

The transfer or translocation of material from one part of the soil to another is common in most soils. Organic matter is moved from the upper part of the profile to the lower part in suspension or solution. Calcium is leached from the surface layer and is held by the clay in the subsoil. The Bedington and Laidig are examples of soils in which the results of this process can be seen. In those soils clay has accumulated in the B horizon as a result of transfers of clay from horizons higher in the profile.

Bases and plant nutrients are moved upward when they are absorbed by the roots of plants and rise in the stem to be stored in the leaves and twigs. When the plant dies and decays, the plant nutrients are returned to the soil.

Transformations occur as chemical weathering takes place. During the process of chemical weathering, iron, aluminum, calcium, and other elements are released from the primary and secondary minerals in the soil. The gray and black colors of the parent material of a well-drained Berks soil, for example, gradually are replaced by the red, brown, and yellow colors of oxidized iron compounds as the parent material weathers. These changed colors indicate that iron has been released or that ferrous oxide has been oxidized to ferric oxide in the presence of an adequate supply of oxygen.

The soil profile

A soil profile forms as the result of the interaction of the four factors of soil formation—plant and animal life, climate, relief, and time—on the parent material. In a mature soil profile that has developed under forest, horizons have formed in the following sequence.

The O1 to O2 horizons are generally the first to form on the accumulated weathered parent material. The O2 horizon is the one in which the maximum amount of organic matter has accumulated. Examples of this horizon can be seen in the profiles described as typical for the Edgemont and Lewisberry series.

The A horizon, or surface layer, is beneath the O2. Its formation parallels that of the O2 horizon. The A horizon is commonly subdivided into two layers, the A1 and A2. The A1 horizon consists of mixed, dark-colored, organic and mineral soil material. The A2 horizon, just beneath the A1, becomes apparent after weathering and leaching (eluviation) have removed the soluble substances from the upper A horizon. If the A horizons have been mixed in plowing, and if crop residue and manure have been incorporated into the surface layer, the layer is then designated as an Ap horizon. An example of an Ap horizon is that shown in the profile described for the Berks series.

The B horizon, or subsoil, is part of the soil profile beneath the A horizon. It generally has a higher content of clay and a lower content of organic matter than the A horizon. The B horizon forms after the A horizon has developed. It is often called the illuviated horizon, or the horizon that has retained some of the substances, such as clay, iron, aluminum, oxides, and organic colloids, that have moved out of the A horizon. The B horizon is also a horizon that contains many secondary minerals. These are dominantly silicate clay and are derived from altered primary minerals. Some consider the B horizon to be the result of both illuviation and transformation.

The B horizon has three main subdivisions—the B1, B2, and B3 horizons. The B1 horizon has weakly developed features of the B horizon. The B2 generally contains the largest amount of clay of any of these horizons. Examples of soils that have a high content of clay in the B2 horizon are those of the Athol series. This high content of clay is shown both in the laboratory data for the Athol soils and in the profile described as typical for the Athol series. The B3 horizon is a horizon that has some properties of the B and some properties of the C horizon. In most places it contains a smaller accumulation of clay and contains less altered primary minerals than the B2 horizon.

Together, the A and B horizons constitute the solum—the zone in which most of the organic and mineral matter has been added, removed, transferred or translocated through soil-forming processes.

Below the solum is the C horizon, also called the substratum, consisting of relatively unweathered parent material. In some places this horizon contains some of the material that has leached out of both the A and B

horizons as a result of weathering. The C horizon is composed mainly of partly weathered minerals and fragments of rock.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodlands; in developing rural areas; in performing engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*14*) and later revised (*12*). The system currently used was adopted for general use by the National Cooperative Survey in 1965. The current system is under continual study. Therefore, readers interested in developments of the current system should search the latest literature available (*10*, *19*).

The current system of classification is based on morphological characteristics that reflect the genesis of soils. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. Table 9 places the soil series in Berks County in some categories of the current system and in the great soil groups of the older system. Some of the classes of the current system are briefly defined in the following paragraphs.

TABLE 9.—*Classification of the soils*

Soil series	Family	Subgroup	Order	Great soil group of the 1938 system
Allenwood	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Andover	Fine-loamy, mixed, mesic	Typic Fragiaquults	Ultisols	Low-Humic Gley soils.
Athol	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Atkins	Fine-loamy, mixed, acid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Baile	Fine-loamy, mixed, mesic	Typic Ochraquults [1]	Ultisols	Low-Humic Gley soils.
Bedington	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Berks	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides intergrading toward Lithosols.
Birdsboro	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Bowmansville	Fine-loamy, mixed, nonacid, mesic.	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Brandywine	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides intergrading toward Lithosols.
Brecknock	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Brinkerton	Fine-silty, mixed, mesic	Typic Fragiaquults	Ultisols	Low-Humic Gley soils.
Buchanan	Fine-loamy, mixed, mesic	Aquic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Burgin	Fine, mixed, mesic	Typic Ochraqualfs	Alfisols	Low-Humic Gley soils.
Chester	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Comly	Fine-loamy, mixed, mesic	Aquic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Croton	Fine-silty, mixed, mesic	Typic Fragiaqualfs	Alfisols	Low-Humic Gley soils.
Dekalb	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Duffield	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Edgemont	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Fogelsville [2]	Fine-silty, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.

See footnotes at end of table.

TABLE 9.—*Classification of the soils*—Continued

Soil series	Family	Subgroup	Order	Great soil group of the 1938 system
Glenville	Fine-loamy mixed, mesic	Aquic Fragiudults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Hagerstown	Fine, mixed, mesic	Typic Hapludalfs [1]	Alfisols	Reddish-Brown Lateritic soils.
Klinesville	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols intergrading toward Sols Bruns Acides.
Laidig	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Lamington	Fine-loamy, mixed, mesic	Typic Fragiaquults	Ultisols	Low-Humic Gley soils.
Lehigh	Fine-loamy, mixed, mesic	Mollic Ochraqualfs [1]	Alfisols	Gray-Brown Podzolic soils intergrading toward Planosols.
Lewisberry	Coarse-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Lindside	Fine-silty, mixed, mesic	Aquic Fluventic Eutrochrepts	Inceptisols	Alluvial soils.
Litz	Loamy-skeletal, mixed, mesic	Ruptic-Ultic Dystrochrepts	Inceptisols	Red-Yellow Podzolic soils intergrading toward Lithosols.
Melvin	Fine-silty, mixed, nonacid, mesic.	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Murrill	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Neshaminy	Fine-loam, mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils intergrading toward Reddish-Brown Lateritic soils.
Penn	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Philo	Coarse-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils.
Pope	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Raritan	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Readington	Fine-loamy, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Reaville	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Lithosols.
Rowland	Fine-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils.
Ryder	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Washington	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Watson	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Weikert	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols intergrading toward Sols Brun Acides.
Wiltshire	Fine-loamy, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.

[1] Tentative classification.
[2] This series had tentative status when this publication was sent to the printer.

ORDER.—Ten soil orders are recognized. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different kinds of climate. The three orders in Berks County are Inceptisols, Alfisols, and Ultisols.

Inceptisols generally form on young, but not recent land surfaces. Their name is derived from the Latin word *inceptum*, meaning beginning. It indicates that the development of these soils is just beginning.

Alfisols have a distinct accumulation of clay in the B horizon and have a base saturation of more than 35 percent. The base saturation increases with increasing depth.

Ultisols have a clay-enriched B horizon that has less than 35 percent base saturation, and the base saturation decreases with increasing depth.

SUBORDER.—Each order is subdivided into groups (suborders) that are based mostly on soil characteristics that seem to produce classes having the greatest similarity from the standpoint of their genesis. Suborders narrow the broad climatic range of soils that are in orders.

Soil characteristics used to separate suborders mainly reflect either the presence or absence of waterlogging, or soil differences produced through the effects of climate or vegetation. The names of suborders contain two

syllables, the last of which indicates the order. An example is Aquepts (Aqu, meaning water or wet, and ept, from Inceptisols).

Great Group.—Soil suborders are separated into great groups on the basis of uniformity in kinds and sequences of major soil horizons and other features. The horizon used as a basis for distinguishing between great groups are those in which (1) clay, iron, or humus has accumulated; (2) pans that interfere with growth of roots, movements of water, or both, have formed; or (3) a thick, dark-colored surface horizon has developed. The other features commonly used are the self-mulching properties of clay, temperature of the soil, and major differences in chemical composition (mainly the bases calcium, magnesium, sodium, and potassium).

Names of the great groups consist of three or four syllables. They are made by adding a prefix to the name of the suborder. An example is Haplaquepts (*Hapl*, meaning usual, and *aquepts* meaning soils seasonally saturated with water). The great group is not shown separately in table 9, because it is the last word in the name of the subgroup.

Subgroup.—Great soil groups are subdivided into subgroups. One of these represents the central, or typic, segment of the group. Other subgroups have properties of the group but have one or more properties of another great group, suborder, or order, and these are called intergrades. Also, subgroups may be established for soils having properties that intergrade outside the range of any other great group, suborder, or order. The names of subgroups are formed by placing one or more adjectives ahead of the name of the great group. An example is Fluventic Haplaquepts.

Family.—Families are separated within a subgroup, primarily on the basis of properties that are important to the growth of plants or to the behavior of soils used for engineering. The main properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizon, and consistence. The names of families consist of a series of adjectives that precede the name of a subgroup. The adjectives used are the class names for soil texture, mineralogy, and so on (see table 9). An example is the fine-loamy, mixed, acid, mesic family of Fluventic Haplaquepts.

Laboratory Determinations [6]

Physical and chemical properties of selected soil profiles of soils in five series in Berks County are shown in tables 10 and 11. The series sampled are the Athol, Berks, Edgemont, Lewisberry, and Ryder. A profile of each of the soils sampled is described in the section "Descriptions of the Soils."

One site for sampling was selected for each series. Typical profiles were located in areas where the soils were in the most common land use, and where the slopes and degree of erosion were typical. Samples were collected from each horizon that could be recognized in a pit dug through the solum and into the parent material.

[6] Laboratory analyses were made at the Pennsylvania Soil Characterization Laboratory of the Pennsylvania State University by R. P. Matelski, C. F. Engle, and other members of the staff.

Methods of Analyses

In preparation of laboratory analysis, air-dry samples were crushed with a rolling pin. Care was taken to avoid breaking the nonsoil material into fragments small enough to pass a 2-millimeter sieve. All laboratory determinations, except those for bulk density and moisture retention at one-third bar tension, were made on the part of the sample consisting of soil material that passed the 2-millimeter sieve.

Particle size was determined by the pipette method, with dispersion by sodium hexametaphosphate and by mechanical shaking, using the procedure developed by Kilmer and Alexander (*4*, *5*).

Bulk density was determined on 1- by 2-inch cylindrical core samples. The samples were taken using a Salinity Laboratory Modified Uhland Core Sampler (*13*, *16*).

Moisture retention, at a tension of one-third bar, was determined by testing core samples on a porous plate (*8*). Moisture retention at a tension of 15 bars was determined by using a pressure membrane apparatus on the fragmented samples (*8*).

Organic carbon was determined by a modification of the Walkley-Black wet combustion method (*7*).

Total nitrogen was determined by the Kjeldahl method (*2*), which was modified by trapping ammonia in a boric acid solution and titrating with sulfuric acid.

Extractable calcium, magnesium, sodium, and potassium were determined by extraction with neutral normal ammonium acetate (*7*). Extractable hydrogen was determined by using a barium chloride solution buffered at a reaction of pH 8.1 with triethanolamine (*7*). The cation-exchange capacity was determined by distillation of absorbed ammonia after extraction with sodium chloride (*7*).

Reaction was determined by using a Beckman zeromatic pH meter and a soil-water ratio of 1 to 1.

Clay minerals were identified by means of a Norelco X-ray spectrometer equipped with a Geiger counter and a chart recorder, using a copper target. Flat-oriented clay samples (less than two microns), in the form of a thin film on a glass slide, were analyzed as magnesium saturated-water solvated, as magnesium saturated-glycerol solvated, and as potassium saturated-water solvated specimens. Prior to saturation, organic matter was removed from the clay by treatment with 10 percent hydrogen peroxide, and free iron oxides were removed by the method developed by Jeffries (*3*). The clay mineral types designated as chlorite refer to 14 angstron clay material that does not collapse when saturated with potassium.

Summary of Data

Physical properties of soils are important in assessing the engineering or structural utility of soils. Also, these physical properties influence the tilth and moisture regime, which are both important to farming. Stability of the soils and most structural properties depend largely on the combined effects of internal friction and cohesion. Capillarity, permeability, elasticity, and compressibility also depend largely on the size of the particles and on their distribution in the soil mass.

TABLE 10.—*Mechanical analyses and physical properties of selected soils*

[Dashes in columns indicate sample not taken or material not present]

Soil and sample number	Horizon	Depth from surface	Particle-size distribution: Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Medium sand (0.5 to 0.25 mm.)	Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)	Coarse fragments (larger than 2.0 mm.)	Bulk density	Moisture held at tension of—: ⅓ bar (core)	15 bars (less than 2 mm.)	Available moisture
		In.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct. by weight*	*Gm./cc.*	*Pct.*	*Pct.*	*In./in. of soil depth*
Athol silt loam:														
S62 Pa 6-4-1	Ap	0–8	3.0	5.5	6.3	5.8	7.2	54.2	18.0	26	1.41	23.8	8.7	0.21
S62 Pa 6-4-2	B21t	8–16	3.3	5.3	5.8	6.1	7.6	44.7	27.2	30	1.53	20.9	10.3	.16
S62 Pa 6-4-3	B22t	16–24	4.7	6.8	7.2	6.4	8.8	43.1	23.0	39	1.75	18.2	9.4	.15
S62 Pa 6-4-4	B31	24–32	4.7	7.3	7.9	8.0	10.3	41.0	20.8	40	1.70	17.6	8.6	.15
S62 Pa 6-4-5	B32	32–50	4.7	9.8	11.4	9.5	5.1	40.4	19.1	42	1.75	16.7	8.4	.15
Berks shaly silt loam:														
S62 Pa 6-1-1	Ap	0–9	7.2	10.2	5.9	3.9	3.6	51.2	18.0	38	1.25	28.4	15.8	.16
S62 Pa 6-1-2	B21	9–18	12.5	12.0	6.7	3.6	2.2	41.7	21.3	39	1.43	22.0	12.7	.13
S62 Pa 6-1-3	B22	18–24	9.2	11.4	6.8	4.4	3.8	37.8	26.6	50	1.46	20.1	12.8	.11
S62 Pa 6-1-4	C1	24–33	10.8	13.0	7.2	4.8	4.2	34.0	26.0	64	1.56	21.0	13.8	.11
S62 Pa 6-1-5	C2	33–38+	12.0	16.4	9.3	5.3	3.3	27.3	26.4	80	------	------	14.8	------
Edgemont very stony sandy loam:														
S62 Pa 6-6-0	O1	1–½	------	------	------	------	------	------	------	------	------	------	------	------
S62 Pa 6-6-1	O2	½–0	------	------	------	------	------	------	------	------	------	------	44.0	------
S62 Pa 6-6-2	A1	0–1	15.7	23.9	14.1	10.8	6.7	23.6	5.2	35	------	------	8.2	------
S62 Pa 6-6-3	A2	1–8	7.3	15.2	15.1	13.4	8.6	30.0	10.4	54	------	------	6.5	------
S62 Pa 6-6-4	B1	8–12	10.0	14.7	14.9	12.2	8.1	30.1	10.0	34	1.51	14.9	6.2	.13
S62 Pa 6-6-5	B21t	12–24	10.8	14.3	12.8	9.5	6.5	28.7	17.4	31	1.68	13.6	7.6	.10
S62 Pa 6-6-6	B22t	24–36	9.5	13.0	11.3	9.1	6.4	28.7	22.0	44	1.65	18.4	9.6	.15
S62 Pa 6-6-7	C	36–48	15.0	22.8	16.5	8.5	5.6	21.4	10.2	37	1.65	15.1	7.8	.12
Lewisberry very stony sandy loam:														
S62 Pa 6-8-0	O1	1½–½	------	------	------	------	------	------	------	------	------	------	------	------
S62 Pa 6-8-1	O2	½–0	------	------	------	------	------	------	------	------	------	------	50.4	------
S62 Pa 6-8-2	A1	0–4	7.6	17.2	18.2	10.2	6.8	32.3	7.7	58	1.02	25.9	6.2	.20
S62 Pa 6-8-3	A2	4–10	8.1	19.5	19.1	10.6	6.8	31.0	5.0	36	1.68	10.2	2.6	.13
S62 Pa 6-8-4	A3	10–12	13.7	19.4	17.1	8.8	5.9	28.9	6.2	34	------	------	2.5	------
S62 Pa 6-8-5	B1	12–16	13.4	19.4	16.2	8.9	5.8	28.2	8.1	39	1.71	9.3	2.7	.11
S62 Pa 6-8-6	B21t	16–24	9.0	18.8	18.2	9.5	5.8	26.9	11.8	44	1.80	9.3	4.5	.09
S62 Pa 6-8-7	B22t	24–30	8.4	17.1	15.7	7.5	5.0	27.5	18.8	46	1.74	11.3	6.4	.09
S62 Pa 6-8-8	B23t	30–36	6.8	12.8	11.7	5.8	4.3	35.2	23.4	37	------	------	8.7	------
S62 Pa 6-8-9	C	36–50	5.9	18.6	24.4	8.7	4.2	17.3	20.9	25	------	------	7.0	------
Ryder silt loam:														
S62 Pa 6-9-1	Ap	0–7	2.4	3.9	2.8	2.7	4.4	56.5	27.3	1	1.21	29.9	12.7	.21
S62 Pa 6-9-2	B21t	7–11	1.6	2.9	2.6	2.7	5.8	55.6	28.8	7	1.33	28.1	12.4	.21
S62 Pa 6-9-3	B22t	11–17	1.8	2.8	2.4	2.5	6.4	57.8	26.3	7	1.30	29.0	11.4	.23
S62 Pa 6-9-4	B3	17–21	1.5	3.0	2.6	2.5	6.6	57.7	26.1	6	1.34	28.6	10.9	.24
S62 Pa 6-9-5	C	21–33	2.0	3.1	2.4	2.5	7.0	58.9	24.1	8	1.21	30.4	10.2	.24

The proportion of the particles of different sizes determine the textural classes, which are categories used in soil classification.

Chemical properties of soils are important in assessing the natural fertility of the soils and in determining the value of the soils for farming. Also, chemical properties govern the rate of corrosion and weathering of buried engineering structures.

Discussed in the following paragraphs are the particle-size distribution, available moisture, content of organic carbon, and clay mineral composition of each soil for which samples were taken and examined.

Athol Series, Profile S62 Pa–6–4 (1–5)

An Athol silt loam that has slopes of 6 percent was described and sampled for characterization studies. This soil is considered to be representative of the Athol series in Berks County.

The particle-size distribution determined by laboratory tests shows an increase of 9 to 10 percent clay from the A to the B horizon, indicating the presence of a textural B horizon. The content of coarse fragments increases from 26 percent in the A horizon to 42 percent in the lower B horizon.

Available moisture, calculated from the bulk density and the difference between the moisture held at one-third bar tension and that held at 15 bars tension, indicates that these soils hold about 5 to 8 inches of water available for the use of plants.

The high content of organic carbon in the plow layer, a measure of the content of organic matter, probably reflects the amount of crop residue and manure incorporated in this layer.

The clay mineral composition of the Athol profile shown in table 11 is similar to that of the Berks modal profile sampled in this county. Illite is dominant in the subsoil, and interstratified vermiculite and chlorite are dominant in the surface layer. In contrast to the Berks profile, which does not contain kaolinite, the profile of the Athol soil contains a minor amount of kaolinite. The distribution of clay minerals in this profile is characteristic of that caused by weathering in the normal profile of a mature, well-drained soil.

Berks Series, Profile S62 Pa–6–1 (1–5)

A Berks shaly silt loam that has slopes of 8 to 15 percent was described and sampled for characterization studies. This soil is considered to be representative of the Berks series in this county.

The particle-size distribution in the profile indicates that there has been an increase in the content of clay with increasing depth. This indicates variability in the clay content of the original shale material. The content of coarse fragments increases from 38 percent in the A horizon to 80 percent in the C horizon. The available moisture, calculated from the bulk density and the difference between the moisture held at one-third bar tension and that held at 15 bars tension, indicates that the solum of these soils holds from about 2.5 to 3.6 inches of water available for the use of plants.

The content of organic carbon is highest in the plow layer. It decreases with depth.

The reaction of the soil is neutral to strongly acid. The pH generally decreases with depth, which probably indicates that agricultural lime has been applied to the surface.

This Berks profile is characterized by a dominance of illite in the subsoil and by a large amount of interstratified chlorite and vermiculite in the A horizon. This distribution of clay minerals is typical for a well-drained, mature soil. The illite and partly weathered chlorite were contributed by the Martinsburg formation, which consists of shale of Ordovician age that is in the parent rock for Berks soils. Weathering of both the illite and chlorite has developed the chlorite and vermiculite minerals in the surface layer.

Edgemont Series, Profile S62 Pa–6–6 (0–7)

An Edgemont very stony sandy loam that has slopes of 10 percent was described and sampled for characterization studies. This soil is considered to be representative of the Edgemont series in Berks County.

The particle-size distribution determined by laboratory tests shows an increase to 22 percent clay in the lower B horizon, which indicates the presence of a textural B horizon. The content of coarse fragments remains constant or decreases slightly with depth.

The available moisture, calculated from the bulk density and the difference between the moisture held at one-third bar tension and that held at 15 bars tension, indicates that the solum of these soils holds 4 to 5 inches of water available for the use of plants.

The A1 horizon contains more organic carbon than the other horizons. It has the darkest color and contains the most organic matter of any of the mineral horizons.

The higher base saturation in the A horizon than in the B horizons indicates that bases have apparently been recycled from the lower part of the solum to the surface layer under a hardwood forest.

Soil reaction ranges from extremely acid to very strongly acid and is fairly constant in all horizons. This soil has apparently not received any agricultural lime.

Kaolinite is the dominant clay mineral in all horizons. The clay mineral suite is primarily inherited from the parent rock, which is quartzite of the Tuscarora and Hardyston formations. Rocks of this type—dominantly consisting of quartz sand grains—typically contain kaolinite as the predominant clay component. The parent rock has also contributed some illite and montmorillonite to the soil. Weathering has not greatly influenced the clay mineral types in this profile, except for development of some chlorite in the A horizon.

Lewisberry Series, Profile S62 Pa–6–8 (0–9)

A Lewisberry very stony sandy loam that has slopes of 11 percent was described and sampled for characterization studies. This soil is considered to be representative of the Lewisberry series in this county.

The particle-size distribution shows an increase to 23 percent clay in the B horizon, which indicates the presence of a textural B horizon. The content of coarse fragments in the B horizon increases somewhat or remains nearly constant with depth.

TABLE 11. *Chemical*

[Dashes in columns indicate sample

Soil and sample number	Horizon	Depth from surface	Organic carbon	Nitrogen	Carbon-nitrogen ratio	Calcium-magnesium ratio
		In.	*Pct.*	*Pct.*		
Athol silt loam:						
S62 Pa 6-4-1	Ap	0-8	1. 29	0. 164	7. 9	3. 9
S62 Pa 6-4-2	B21t	8-16	. 13	. 074	----------	1. 0
S62 Pa 6-4-3	B22t	16-24	. 07	----------	----------	1. 8
S62 Pa 6-4-4	B31	24-32	. 03	----------	----------	1. 0
S62 Pa 6-4-5	B32	32-50	. 00	----------	----------	1. 0
Berks shaly silt loam:						
S62 Pa 6-1-1	Ap	0-9	2. 30	. 243	9. 5	9. 5
S62 Pa 6-1-2	B21	9-18	. 30	. 065	4. 6	8. 6
S62 Pa 6-1-3	B22	18-24	. 24	. 059	4. 1	4. 2
S62 Pa 6-1-4	C1	24-33	. 18	----------	----------	1. 3
S62 Pa 6-1-5	C2	33+	. 10	----------	----------	. 7
Edgemont very stony sandy loam:						
S62 Pa 6-6-0	O1	1-½	----------	----------	----------	----------
S62 Pa 6-6-1	O2	½-0	23. 44	----------	----------	----------
S62 Pa 6-6-2	A1	0-1	4. 99	----------	----------	----------
S62 Pa 6-6-3	A2	1-8	2. 08	. 117	17. 8	----------
S62 Pa 6-6-4	B1	8-12	. 71	. 055	12. 9	----------
S62 Pa 6-6-5	B21t	12-24	. 11	----------	----------	----------
S62 Pa 6-6-6	B22t	24-36	. 07	----------	----------	----------
S62 Pa 6-6-7	C	36-48+	. 10	----------	----------	----------
Lewisberry very stony sandy loam:						
S62 Pa 6-8-0	O1	1½-½	----------	----------	----------	----------
S62 Pa 6-8-1	O2	½-0	28. 17	----------	----------	----------
S62 Pa 6-8-2	A1	0-4	4. 32	. 107	40. 4	----------
S62 Pa 6-8-3	A2	4-10	. 45	. 040	11. 2	----------
S62 Pa 6-8-4	A3	10-12	. 17	----------	----------	----------
S62 Pa 6-8-5	B1	12-16	. 10	----------	----------	----------
S62 Pa 6-8-6	B21t	16-24	. 08	----------	----------	----------
S62 Pa 6-8-7	B22t	24-30	. 04	----------	----------	----------
S62 Pa 6-8-8	B23t	30-36	. 08	----------	----------	----------
S62 Pa 6-8-9	C	36-50	. 19	----------	----------	----------
Ryder silt loam:						
S62 Pa 6-9-1	Ap	0-7	1. 48	. 213	6. 9	----------
S62 Pa 6-9-2	B21t	7-11	. 21	. 185	1. 1	----------
S62 Pa 6-9-3	B22t	11-17	. 15	----------	----------	----------
S62 Pa 6-9-4	B3	17-21	. 13	----------	----------	----------
S62 Pa 6-9-5	C	21-33	. 13	----------	----------	----------

[1] In all samples, except the Lewisberry, the mineral composition of the clay fraction is chlorite/vermiculite; the mineral composition of the clay fraction is chlorite/vermiculite/illite in the Lewisberry samples.

properties of selected soils

not taken or material not present]

Extractable cations (Milliequivalents per 100 grams of soil)					Cation-exchange capacity (sum)	Base saturation (sum)	Reaction field (electrometric)	Mineral composition of clay fraction					Interstratified [1]
Calcium	Magnesium	Sodium	Potassium	Hydrogen				Kaolinite	Illite	Vermiculite	Chlorite	Montmorillonite	
					Meq./100 gms. of soil	*Pct.*	*pH*						
3. 5	0. 9	0. 2	0. 4	9. 0	14. 0	36	6. 0	10	30	10	10	--------	40
1. 7	1. 7	. 2	. 1	4. 2	7. 9	47	6. 2	--------	--------	--------	--------	--------	--------
2. 9	1. 7	. 2	. 2	4. 7	9. 7	52	6. 1	10	60	10	--------	--------	20
1. 9	1. 9	. 1	. 2	5. 8	9. 9	41	5. 6	--------	--------	--------	--------	--------	--------
1. 9	2. 0	. 1	. 2	7. 3	11. 5	37	5. 5	10	70	--------	--------	--------	20
9. 5	1. 0	. 2	. 8	11. 3	22. 8	50	6. 6	--------	20	--------	--------	--------	80
6. 9	. 8	. 1	. 2	6. 3	14. 3	56	6. 8	--------	--------	--------	--------	--------	--------
4. 2	1. 0	. 1	. 2	10. 0	15. 5	36	5. 4	--------	60	--------	--------	--------	40
3. 1	2. 3	. 1	. 3	9. 7	15. 5	37	5. 4	--------	--------	--------	--------	--------	--------
2. 4	3. 4	. 1	. 4	9. 7	16. 0	39	5. 3	--------	60	--------	--------	--------	40
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
--------	--------	--------	--------	--------	--------	--------	5. 3	--------	--------	--------	--------	--------	--------
1. 2	. 5	. 2	. 5	11. 9	14. 3	17	4. 3	--------	--------	--------	--------	--------	--------
. 5	. 7	. 2	. 7	12. 1	14. 2	15	5. 0	60	10	--------	10	--------	20
. 3	. 8	. 1	. 2	7. 7	9. 1	15	4. 9	60	10	10	10	--------	10
. 3	. 6	. 1	. 2	10. 1	11. 3	11	4. 7	--------	--------	--------	--------	--------	--------
. 1	1. 5	. 1	. 2	12. 1	14. 0	14	4. 8	60	10	10	10	--------	10
. 1	1. 4	. 2	. 1	14. 7	16. 5	11	4. 7	60	10	--------	10	10	10
--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
--------	--------	--------	--------	--------	--------	--------	4. 4	--------	--------	--------	--------	--------	--------
. 1	. 4	. 2	. 2	13. 5	14. 4	6	4. 5	20	20	50	--------	--------	10
. 1	. 5	. 1	. 1	4. 2	5. 0	16	4. 4	--------	--------	--------	--------	--------	--------
<. 1	. 4	. 1	. 1	3. 8	4. 4	14	4. 6	20	20	40	10	--------	10
. 1	<. 1	. 1	. 1	3. 8	4. 1	7	4. 8	--------	--------	--------	--------	--------	--------
. 1	. 6	. 2	. 1	4. 7	5. 7	17	4. 6	20	40	20	10	--------	10
. 2	. 6	. 2	. 1	6. 7	7. 8	14	4. 6	--------	--------	--------	--------	--------	--------
. 3	. 7	. 2	. 1	5. 9	7. 2	18	4. 6	20	50	10	10	--------	10
. 3	. 8	. 2	. 1	5. 7	7. 1	20	5. 0	20	50	10	10	--------	10
2. 6	. 8	. 1	. 2	7. 3	11. 0	34	6. 0	--------	70	--------	20	--------	10
1. 4	. 6	. 2	. 1	4. 1	6. 4	36	6. 0	--------	70	--------	20	--------	10
1. 1	. 5	. 1	. 2	4. 3	6. 2	31	5. 8	--------	70	--------	20	--------	10
. 9	. 6	. 1	. 1	5. 5	7. 2	24	4. 8	--------	70	--------	20	--------	10
. 8	. 3	. 1	. 1	6. 3	7. 6	17	4. 9	--------	70	--------	20	--------	10

The available moisture, calculated from the bulk density and the difference between the moisture held at one-third bar tension and that held at 15 bars tension, indicates that the solum of these soils holds 3 to 5 inches of water available for the use of plants.

The A1 horizon contains more organic carbon than the other horizons, and it is also darker colored and contains more organic matter. The soil reaction ranges from extremely acid to very strongly acid. The pH increases slightly with depth. The acid reaction and the irregular base saturation suggest that residual lime from the parent material, or lime added when the soil was farmed, have not affected this soil to any great extent.

Ryder Series, Profile S62 Pa–6–9 (1–5)

A Ryder silt loam that has slopes of 9 percent was described and sampled for characterization studies. This soil is considered to be representative of the Ryder series in this county.

The particle-size distribution shows that the highest content of clay is in the horizon just beneath the plow layer. The content of clay then decreases with depth. The position of this soil and field morphology suggest that a textural B horizon has developed but that erosion has since removed part of the subsoil. The content of coarse fragments increases with depth but is less than 20 percent.

The available moisture, calculated from the bulk density and the difference between the moisture held at one-third bar tension and that held at 15 bars tension, indicates that the solum of these soils holds 4 to 5 inches of moisture available for the use of plants.

The Ap horizon, where crop residue and manure have been mixed during tillage, contains the largest amount of organic carbon. The content of organic carbon decreases rapidly with depth.

In these soils base saturation decreases with depth. Soil reaction ranges from slightly acid to strongly acid.

The clay mineral suite contains an unusually well crystallized illite component as compared to the crystallinity of illite typically found in soils. In addition to this prominent illite component, the soil contains a chlorite component that is also well crystallized. In contrast to the unweathered appearance of the illite, however, the chlorite has been slightly altered so that it is a chlorite-vermiculite interstratified component. The parent rock, which consists of cement rock and cement limestone of the Hershey and Myerstown formations, is the dominant factor controlling the properties of the clay minerals in this profile. According to geologic reports of the neighboring Lehigh County (*6*), the cement rock in many places has a slaty cleavage, which on fresh surfaces shows glistening particles of very fine grained sericite. This kind of mica mineral is the dominant clay mineral in the profile sampled.

Additional Facts About the County

This section gives brief facts about the history of the county. It also provides general information about the climate and the water supply.

The area has been settled for many years. Swedes built the first settlement near the confluence of Manatawny Creek and the Schuylkill River. They arrived in 1701, French Huguenots arrived in 1704, Germans in 1712, Irish in 1719, and English in 1720. These people came to the area, mainly because of the liberal religious beliefs and land policies of William Penn.

Climate [7]

Berks County has a fairly moderate, humid, continental climate. Because of its location on the leeward side of the mountains, in the east-central part of Pennsylvania, winters are comparatively short and mild and the warm season is long but is frequently humid. In summer the relative humidity drops to 35 to 45 percent during the afternoons, but the average relative humidity for the year is generally higher than 65 percent. About two-thirds of the time, skies are clear to partly cloudy, and the average amount of sunshine is about 57 percent of the possible amount. Storms are generally numerous enough that they insure an adequate and dependable supply of moisture throughout the year.

This county is near the path of the major weather systems that move across the nation. Therefore, the weather is variable. Changes in temperature, in velocity of the wind, in humidity, and in other weather elements tend to occur from day to day and from week to week, and seasonal weather varies from year to year. During winter and spring, changes occur almost daily. During summer and fall, changes are less frequent because the high and low pressure systems that are responsible for the weather move more slowly during those seasons than they do in winter and spring.

From June or July through October, the weather remains approximately the same for a week or more at a time. Hot, humid days and mild nights generally result when a pressure system remains stagnant for several days in summer. Cool nights are typical when a pressure system remains stagnant for several days in fall. Several of these spells can be expected in most years, though extreme heat is noticeably absent in some summers. During winter and spring, unseasonably warm or unseasonably cold spells last for only a few days, because the weather systems then move more rapidly than in summer and fall.

Temperature

The mountains throughout the central part of Pennsylvania tend to slow the air masses that move across this area from Canada, and they moderate the temperature to some extent. As a result, temperatures in Berks County are milder than in most parts of the State and in other areas at the same latitude in the central part of the United States. The average annual temperature is slightly higher than 54° F. in the valley that extends through the county, and it is somewhat lower at higher elevations.

The valley contains many depressions, and it is surrounded by forested hills and mountains, notably the Blue Ridge along the northern border, the Wernersville Ridge in the western part of the county, and the Reading Prong in the eastern part. These differences in relief cause local variations in temperature. Afternoon temper-

[7] By NELSON M. KAUFFMAN, State climatologist, U.S. Weather Bureau, Harrisburg, Pa.

atures are somewhat lower at the higher elevations than at lower ones. Overnight cooling is more extensive in the valley than at higher elevations, because cool air is heavier than warm air, and it drains from the higher areas into the valley. As a result, freezing temperatures occur in the valley earlier in fall and later in spring than in other areas. Therefore, the growing season is somewhat shorter in the valley than on the surrounding hillsides.

The average monthly temperatures normally range from slightly more than 30° F. in January to 77° in July. An increase of about 10° takes place each month from March through June, and a decrease of about 10° takes place each month from October through December. Most of the time, the average monthly temperature rises no higher than 5° above normal or drops no lower than 5° below normal, but daily departures from normal can be considerably greater. Temperatures of below zero and of above 100° are rare, though extremes in the city of Reading have ranged from —14° to 105°. In rural areas temperatures have dropped even lower than —14°. Average daily maximum and average daily minimum temperatures, as well as extremes by months, are shown in table 12.

From May through September, a maximum temperature of 90° or higher may be expected on an average of 22 days. Of this total number of days, 1 day where the maximum temperature is 90° or higher may be expected in May, 5 days in June, 9 days in July, 5 days in August, and 2 days in September. The number of such days varies from year to year. It ranges from only a few such days during cool summers to more than 40 days in an abnormally warm season. Extremes of 100° or higher have occurred on only 10 days during the last 30 years. On occasion, the temperature reaches 90° or higher as early as mid-April and as late as October.

A combination of uncomfortably high temperature and high humidity can be expected on a number of days during any summer, and this combination sometimes persists for periods ranging from a few days to a week or more in length. Extreme cold weather is unusual in winter. From December through the early part of March, the temperature drops to zero or below on an average of only 1 day every 3 years. Even in an unusually cold winter, temperatures of zero or lower have occurred on only 2 days in Reading but on as many as 10 to 15 days in rural areas in the county. Minimum temperatures of between zero and 10° are somewhat more numerous than temperatures that are zero or lower. They are usually well spaced throughout the winter, and the interval in between is generally relatively mild.

The interval between the date that the last temperature of 32° or lower occurs in spring and the first temperature of 32° or lower occurs in fall is generally known as the growing season. At Reading, the growing season normally extends from April 3 to November 3, or a total of 214 days. Freezing temperatures have occurred as early as March 21, however, and as late as November 20. During the period of record, a growing season as long as 241 days and one as short as 184 days have been reported.

Table 13 shows the probable dates of the last freezing temperatures in spring and the first in fall at Reading. Information in this table indicates, for example, that there is one chance in 10 that a temperature of 32° or lower will occur after April 18 in spring or before October 23 in fall. The figures shown for the probability of 5 years in 10, that is, a 50 percent probability, correspond to the average or normal date of occurrence of freezing temperatures at Reading. Table 13 gives similar information for other threshold temperatures besides the temperatures of 32°.

TABLE 12.—*Temperature and precipitation at Reading, Berks County, Pa.*

Month	Temperature				Precipitation					
	Average daily maximum	Average daily minimum	Average extreme maximum	Average extreme minimum	Average total	One year in 10 will have —		Snow		
						Less than—	More than—	Average total	Average number of days with depth of—	
									1 inch	6 inches
	° *F.*	° *F.*	° *F.*	° *F.*	*Inches*	*Inches*	*Inches*	*Inches*		
January	39	26	59	10	3. 1	1. 4	5. 3	8. 0	8	2
February	41	26	60	10	2. 6	1. 8	4. 2	8. 4	8	2
March	49	33	71	18	3. 8	2. 2	5. 5	5. 5	4	1
April	62	43	83	31	3. 4	1. 5	5. 7	. 4	(1)	0
May	73	53	89	40	3. 8	1. 4	8. 5	0	0	0
June	82	63	94	50	3. 7	1. 6	5. 5	0	0	0
July	86	67	96	56	4. 3	1. 4	6. 8	0	0	0
August	84	66	95	54	4. 1	1. 1	7. 6	0	0	0
September	77	58	91	43	3. 3	. 9	6. 8	0	0	0
October	67	48	84	33	2. 8	1. 6	5. 6	0	0	0
November	53	38	72	23	3. 4	. 6	6. 3	1. 0	1	(1)
December	41	28	61	11	3. 1	1. 3	5. 6	6. 2	5	1
Annual	63	46	[2] 102	[3] —5	41. 4	36. 0	50. 3	29. 5	26	6

[1] Less than 0.5 day.
[2] Highest maximum in 1931–60 period.
[3] Lowest minimum in 1931–60 period.

TABLE 13.—*Probabilities of the last freezing temperatures in spring and the first in fall*

[All data from Reading, Berks County, Pa.]

Probability	Dates for given probability and temperature of—				
	16° F.	20° F.	24° F.	28° F.	32° F.
Spring:					
1 year in 10 later than	March 15	March 22	April 3	April 11	April 18
2 years in 10 later than	March 8	March 15	March 27	April 5	April 13
5 years in 10 later than	February 23	March 4	March 14	March 24	April 3
Fall:					
1 year in 10 earlier than	December 3	November 25	November 19	November 7	October 23
2 years in 10 earlier than	December 8	November 29	November 22	November 10	October 27
5 years in 10 earlier than	December 15	December 8	November 30	November 17	November 3

Because of the location of the thermometers at Reading (on the roof of a building in the center of the city), the data for freezing temperatures given in table 13 are not representative of such temperatures in the rest of the county. To arrive at a more realistic date for a given probability for the rest of the county, about 10 days should be added to the dates given in table 13 for probabilities in spring, and about 10 days should be subtracted from the probabilities in fall. If this is done, it will be found that the growing season for most of the farming areas in the county is about 194 days. Where air drainage is poor, however, as in bowl-shaped valleys, freezing temperatures are likely to occur somewhat later in spring and earlier in fall than in the more open parts of the county.

Precipitation

The annual amount of precipitation, including both rainfall and the water equivalent of melted snow, normally ranges from slightly more than 41 inches in most parts of the county to 44 inches near and along the Blue Ridge. In most years the amount of precipitation is between 36 and 46 inches, which is ample for crops, lawns, and home gardens. In some years, however, the amount has been as little as 28 inches, and in others it has been as much as 56 inches. Precipitation is well distributed throughout the year. The difference in the amount of precipitation received in July, the wettest month, and February, the driest month, is normally less than 2 inches.

Dry spells sometimes affect the entire county, but the precipitation is generally adequate for domestic, industrial, and agricultural needs. A short period when the amount of precipitation is too small to meet the needs of crops can occur at any time, but the effects are more pronounced when such a period occurs during the growing season than at other times, because of the greater need for moisture at that time of year. One of the most severe droughts of record in Berks County occurred in 1963. During that year, precipitation was below normal during every month but two and the total amount of rainfall during the growing season was nearly 5 inches below normal. During most dry seasons, however, deficiencies in normal rainfall usually do not exceed 3 inches.

In the period of December through the early part of March, part of the precipitation falls in the form of snow produced from storms that are more extensive and frequent than those that occur during warm seasons. In addition, winter storms are longer but less intense than summer storms. From time to time, moisture-laden storms that produce heavy snow move northward along the Atlantic seaboard. These cause near blizzard conditions for several days. The snow generally remains for only a short period, however, and the ground is bare much of the time.

The average annual snowfall is nearly 30 inches, though a total of 40 inches can be expected about 1 year in 6. The maximum snowfall received at Reading, according to available records, is 58.8 inches. In few winters is the amount of snow less than 20 inches. Because of the high content of water in the snow, frequently amounting to 2 to 3 inches or more per year, an appreciable amount of snow produces a load on exposed structures sufficient to cause extensive damage. Trees and utility lines are often damaged by such a snowfall. Damage is caused especially by snowstorms that occur late in winter.

Variations in precipitation between any given month and the next, as well as between years for a given month, can be sizable. During the period of record, the amount of monthly precipitation has ranged from less than 0.05 inch, received in October, to nearly 15 inches, received in August. The large amount of precipitation received in August was probably the result of two hurricanes passing near this area.

Nearly 55 percent of the total annual precipitation falls during the period from April through September. During that 6-month period, the total average rainfall throughout most of the county is about 23 inches, but it has been as little as 16 inches in dry seasons and as much as 28 inches in wet seasons. Part of the precipitation received during warm seasons comes in the form of steady, day-long rains. Most of it, however, is produced by showers and thunderstorms that last from only a few minutes to several hours and affect only a part of the county at any given time.

Thunderstorms were responsible for the largest amount of short-period rainfall on record in Berks County. During one period of record, the following amounts of rain were received during thunderstorms: 0.59 inch in 5 minutes; 1.01 inches in 10 minutes; 1.25 inches in 15 minutes; 1.36 inches in 20 minutes; 1.55 inches in 30 minutes; 2.68

inches in 1 hour; 4.89 inches in 2 hours; 5.04 inches in 3 hours; and 5.26 inches in 6 hours. In addition, 5.75 inches of rainfall was received in 12 hours and 6.08 inches was received in 24 hours in storms that were not thunderstorms.

A rainfall intensity of 1 inch per hour can be expected in this county every year; of 2 inches per hour, about once every 10 years; and of 3 inches per hour, once every 100 years. For a 24-hour period, 2.5 inches of rain can be expected about once a year, but 6 inches of rain in 24 hours can be expected only once every 50 years. A large amount of rain during a short period is not necessarily desirable, even during a dry spell, because it causes considerable soil erosion and may damage crops. It also usually causes local flooding because the soils are unable to absorb water at the rate required.

Storms

The most frequent and damaging storms in the county are thunderstorms, which number about 32 per year. These storms can occur at any time during the year but are most frequent from April through September. Hail that often accompanies these storms can cause extensive damage over a limited area. Lightning is by far the most destructive element of these storms. Winds of high velocity that sometimes accompany the storms damage roofs of homes and other buildings.

Wind and heavy rain caused by hurricanes or by remnants of hurricanes occasionally affect the county during the period of July through October. As a rule, the beneficial effects of the rain outweigh the relatively minor damage caused by wind or local floods.

According to available records, only a few small tornadoes have been reported in Berks County. The occurrence of this kind of storm is a possibility, but the probability of one striking a given area is small.

Water Supply

The underlying rocks of Berks County yield varying amounts of water for public use. The areas underlain by shale generally produce only a small amount of water. Those underlain by limestone yield only a small amount where the well is over solid rock, but they yield a large supply where the well intersects a solution channel filled with water.

Surface water meets the needs of about 55 percent of the residents in the county. Antietam Lake and Ontelaunee Lake supply most of the water for the city of Reading. Indian and Stinson Runs supply water for the Birdsboro Borough; Ironstone Creek supplies water for the Boyertown Borough; Mill Creek supplies water for the Hamburg State School; two mountain streams supply water for the Wernersville State Hospital; Plum Creek supplies water for the Berks County Welfare Tract in Bern Township; and Clarks Creek supplies water for the Grace Mines at Morgantown. Total use is estimated at more than 26,500,000 gallons per day.

Between 55,000 and 65,000 residents of the county rely entirely on private sources of water supplied by wells or springs.

Glossary

In this section definitions of technical terms are given for the convenience of readers who cannot easily find the definitions elsewhere. Most of the definitions are similar to those in publications on soil science (*14, 15, 16, 18*) and in other technical publications (*1, 2, 20*). The definitions follow:

Aeration, soil. The process by which air and other gases in the soil are renewed. The rate of soil aeration depends largely on the size and number of pores in the soil and on the amount of water clogging the pores. A soil that has many large pores is generally well aerated.

Aggregate, soil. Many fine particles held in a single mass or cluster, such as a clod, crumb, block, or prism.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. The difference between the amount of moisture held in a soil at field capacity and the amount in the same soil at permanent wilting point. Commonly expressed as inches of water per inch of soil.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist, as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt. See also Texture, soil.

Clay film. A thin coating of clay on the surface of a soil aggregate and in pores. The orientation of the clay is parallel to the surface of the ped, and in thin sections an abrupt boundary separates it from the unoriented material in the matrix. Under a hand lens, the clay film has a smooth, wavy appearance.

Cobblestone. A rounded or partly rounded fragment of rock, 3 to 10 inches in diameter.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Conglomerate. Rock composed of gravel and rounded stones cemented together by hardened clay, lime, iron oxide, or silica.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to the terrace grade and as nearly level as practical.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Diabase. A basic igneous rock, locally called ironstone. It is composed essentially of plagioclase feldspar and augite and of small quantities of magnetite and apatite.

Drainage, soil. (1) The rapidity and extent of the removal of water from the soil by runoff and flow through the soil to underground spaces. (2) As a condition of the soil, soil

drainage refers to the frequency and duration of periods when the soil is free of saturation. In this soil survey, the terms used to describe soil drainage refer to the thickness of the aerated root zone of the soils. The principal terms are *well drained*, at least 36 inches of aerated root zone; *moderately well drained*, 18 to 36 inches; *somewhat poorly drained*, 8 to 18 inches; *poorly drained*, 0 to 8 inches; and *very poorly drained*, lacks a well-aerated root zone.

Duff. The matted, partly decomposed organic surface layer on forested soils.

Eluviation. The removal of material from a soil horizon by downward or lateral movement in solution and, to a lesser extent, in colloidal suspension.

Erosion. The wearing away of the land surface by wind, running water, and other geologic agencies.

Flood plain. Nearly level land, consisting of stream sediment, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon that is very low in content of organic matter and clay but is rich in content of silt or very fine sand. The layer is seemingly cemented when dry, has hard or very hard consistence, and has high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Gleyed horizon. A strongly mottled or gray horizon in wet soils.

Green-manure crop. Any crop grown for the purpose of being turned under while green, or soon after maturity, to improve the soil.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by the soil-forming processes. These are the major horizons.

O horizon. The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residue.

A horizon. The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active, and it is therefore marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon. The mineral horizon below an A horizon. The B horizon is in part of a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; prismatic or blocky structure; redder or stronger colors; or some combination of these characteristics. The combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon. The weathered rock material immediately beneath the solum. This layer, commonly called the soil parent material, is presumed to be like that from which the overlying horizons were formed in most soils. If the underlying material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer. Consolidated rock beneath the soil. The rock generally underlies a C horizon but may be immediately beneath an A or B horizon.

The boundaries between horizons are described so as to indicate their thickness and shape. The terms for thickness are *abrupt*, *clear*, *gradual*, and *diffuse*. The shape of the boundary is described as *smooth*, *wavy*, *irregular*, or *broken*.

Illuvial horizon. A horizon that has received material in solution or suspension from some other part of the soil.

Infiltration. The downward entry of water into the immediate surface of a soil or other material, as contrasted with percolation, which is movement of water through soil layers or soil material.

Ironstone. See Diabase.

Leached layer. A layer in which the soluble constituents have been dissolved and washed away by percolating water.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are these: *Fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimensions; *medium*, ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are *very slow*, *slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *very rapid*.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they can be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay. See also Texture, soil.

Silt. Individual mineral particles in a soil that range from the upper limit of clay (0.002 millimeter) in diameter to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay. See also Texture, soil.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands to serve as a vegetative barrier to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C horizon.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace (conservation practice). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without causing damage. Terraces in fields are generally built so that they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water-holding capacity. See Available moisture capacity.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table is separated from a lower one by a dry zone.

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GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a capability unit, read the introduction to the section it is in for general information about its management. Other information is given in tables as follows:

Estimated productivity ratings, table 1, page 14.
Use of soils for woodland, table 2, page 22.
Use of soils for wildlife, table 3, page 30.
Engineering use of the soils, tables 4, 5, and 6. pages 34 through 53.
Use of soils for community development, table 7, page 56.
Acreage and extent, table 8, page 66.

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page
AgB	Allenwood gravelly silt loam, 2 to 8 percent slopes	68	IIe-2	9
AnB	Andover very stony loam, 0 to 8 percent slopes	69	VIIs-2	13
AsB2	Athol silt loam, 3 to 8 percent slopes, moderately eroded	69	IIe-1	9
AsC2	Athol silt loam, 8 to 15 percent slopes, moderately eroded	69	IIIe-1	10
AsC3	Athol silt loam, 8 to 15 percent slopes, severely eroded	70	IVe-1	11
AsD3	Athol silt loam, 15 to 25 percent slopes, severely eroded	70	VIe-1	12
AtD	Athol very stony and rocky silt loam, 8 to 25 percent slopes	70	VIs-1	12
Au	Atkins silt loam	70	IIIw-2	11
Ba	Baile silt loam	71	Vw-1	12
Bd	Baile very stony silt loam	71	VIIs-2	13
BeB2	Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded	72	IIe-2	9
BeC2	Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded	72	IIIe-2	10
BeD2	Bedington shaly silt loam, 15 to 25 percent slopes, moderately eroded	73	IVe-2	11
BkA2	Berks shaly silt loam, 0 to 3 percent slopes, moderately eroded	74	IIs-2	10
BkB2	Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded	74	IIe-5	9
BkC2	Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded	74	IIIe-3	10
BkD2	Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded	74	IVe-3	12
BkE2	Berks shaly silt loam, 25 to 35 percent slopes, moderately eroded	74	VIe-2	12
BlB	Birdsboro silt loam, 2 to 10 percent slopes	75	IIe-1	9
BmB	Birdsboro-Duffield silt loams, 3 to 10 percent slopes	75	IIe-1	9
Bo	Bowmansville silt loam	76	IIIw-2	11
BrB2	Brandywine channery loam, 3 to 8 percent slopes, moderately eroded	76	IIe-5	9
BrC2	Brandywine channery loam, 8 to 15 percent slopes, moderately eroded	76	IIIe-3	10
BrD2	Brandywine channery loam, 15 to 25 percent slopes, moderately eroded	76	IVe-3	12
BsB	Brecknock channery silt loam, 3 to 8 percent slopes	77	IIe-5	9
BsC2	Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded	77	IIIe-3	10
BsD3	Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded	77	VIe-2	12
BtB	Brecknock very stony silt loam, 0 to 8 percent slopes	77	VIs-1	12
BtD	Brecknock very stony silt loam, 8 to 25 percent slopes	77	VIs-1	12
BtF	Brecknock very stony silt loam, 25 to 60 percent slopes	78	VIIs-1	13
BuA	Brinkerton silt loam, 0 to 3 percent slopes	78	IVw-1	12
BuB2	Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded	78	IVw-1	12
BvB	Buchanan gravelly loam, 3 to 8 percent slopes	79	IIe-4	9
BwB	Buchanan very stony loam, 0 to 8 percent slopes	79	VIs-1	12
Bu	Burgin silt loam, gray surface variant	80	IVw-1	12
ChB2	Chester channery silt loam, 3 to 8 percent slopes, moderately eroded	81	IIe-2	9
ChC2	Chester channery silt loam, 8 to 15 percent slopes, moderately eroded	81	IIIe-2	10
ChC3	Chester channery silt loam, 8 to 15 percent slopes, severely eroded	81	IVe-2	11
ChD2	Chester channery silt loam, 15 to 25 percent slopes, moderately eroded	82	IVe-2	11
ChE3	Chester channery silt loam, 15 to 30 percent slopes, severely eroded	82	VIe-1	12
CnB	Chester very stony silt loam, 0 to 8 percent slopes	82	VIs-1	12
CnD	Chester very stony silt loam, 8 to 25 percent slopes	82	VIs-1	12
CnF	Chester very stony silt loam, 25 to 55 percent slopes	82	VIIs-1	13
CoA	Comly silt loam, 0 to 3 percent slopes	83	IIw-1	10
CoB2	Comly silt loam, 3 to 8 percent slopes, moderately eroded	83	IIe-4	9
CrA	Croton silt loam, 0 to 3 percent slopes	83	IVw-1	12
CrB2	Croton silt loam, 3 to 8 percent slopes, moderately eroded	83	IVw-1	12

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page
DfA	Duffield silt loam, 0 to 3 percent slopes	85	I-1	8
DfB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded	85	IIe-1	9
DfC2	Duffield silt loam, 8 to 15 percent slopes, moderately eroded	85	IIIe-1	10
DfD2	Duffield silt loam, 15 to 25 percent slopes, moderately eroded	85	IVe-1	11
DhC3	Duffield and Hagerstown soils, 8 to 15 percent slopes, severely eroded	85	IVe-1	11
DhE3	Duffield and Hagerstown soils, 15 to 30 percent slopes, severely eroded	85	VIe-1	12
EcB2	Edgemont channery loam, 3 to 8 percent slopes, moderately eroded	86	IIe-2	9
EcC2	Edgemont channery loam, 8 to 15 percent slopes, moderately eroded	86	IIIe-2	10
EcD2	Edgemont channery loam, 15 to 25 percent slopes, moderately eroded	86	IVe-2	11
EdB	Edgemont and Dekalb very stony sandy loams, 0 to 8 percent slopes	86	VIs-1	12
EdD	Edgemont and Dekalb very stony sandy loams, 8 to 25 percent slopes	87	VIs-1	12
EdF	Edgemont and Dekalb very stony sandy loams, 25 to 70 percent slopes	87	VIIs-1	13
FoA	Fogelsville silt loam, 0 to 3 percent slopes	87	I-1	8
FoB2	Fogelsville silt loam, 3 to 8 percent slopes, moderately eroded	87	IIe-1	9
FoC2	Fogelsville silt loam, 8 to 15 percent slopes, moderately eroded	87	IIIe-1	10
GlA	Glenville silt loam, 0 to 3 percent slopes	88	IIw-1	10
GlB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	88	IIe-4	9
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	89	IIe-1	9
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	89	IIIe-1	10
KlB2	Klinesville shaly silt loam, 3 to 8 percent slopes, moderately eroded	89	IIIe-4	11
KlC2	Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded	90	IVe-3	12
KlD2	Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded	90	VIe-2	12
KlF2	Klinesville shaly silt loam, 25 to 45 percent slopes, moderately eroded	90	VIIe-2	13
LaB2	Laidig channery loam, 3 to 8 percent slopes, moderately eroded	91	IIe-2	9
LaC2	Laidig channery loam, 8 to 15 percent slopes, moderately eroded	91	IIIe-2	10
LdB	Laidig very stony loam, 0 to 8 percent slopes	91	VIs-1	12
LdD	Laidig very stony loam, 8 to 25 percent slopes	91	VIs-1	12
Lg	Lamington silt loam	92	IVw-1	12
LhA	Lehigh silt loam, 0 to 3 percent slopes	92	IIIw-1	11
LhB2	Lehigh silt loam, 3 to 8 percent slopes, moderately eroded	92	IIIw-1	11
LhC3	Lehigh silt loam, 8 to 15 percent slopes, severely eroded	92	IVe-3	12
LrB2	Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded	93	IIs-1	9
LrC2	Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded	93	IIIe-5	11
LrC3	Lewisberry gravelly sandy loam, 8 to 15 percent slopes, severely eroded	94	IVe-2	11
LrD2	Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded	94	IVe-2	11
LrD3	Lewisberry gravelly sandy loam, 15 to 25 percent slopes, severely eroded	95	VIe-1	12
LrE3	Lewisberry gravelly sandy loam, 25 to 35 percent slopes, severely eroded	95	VIIe-1	12
LsB	Lewisberry very stony sandy loam, 0 to 8 percent slopes	95	VIs-1	12
LsD	Lewisberry very stony sandy loam, 8 to 25 percent slopes	95	VIs-1	12
LsF	Lewisberry very stony sandy loam, 25 to 60 percent slopes	95	VIIs-1	13
Lt	Lindside silt loam	96	IIw-2	10
LzB2	Litz shaly silt loam, 3 to 8 percent slopes, moderately eroded	96	IIe-5	9
LzC2	Litz shaly silt loam, 8 to 15 percent slopes, moderately eroded	96	IIIe-3	10
LzD2	Litz shaly silt loam, 15 to 25 percent slopes, moderately eroded	96	IVe-3	12
LzE3	Litz shaly silt loam, 15 to 30 percent slopes, severely eroded	97	VIIe-2	13
MaB	Made land, granite and gneiss materials, sloping	97	------	--
MaD	Made land, granite and gneiss materials, strongly sloping	97	------	--
MdB	Made land, limestone materials, sloping	97	------	--
MdD	Made land, limestone materials, strongly sloping	97	------	--
MeB	Made land, shale and sandstone materials, sloping	97	------	--
Ml	Melvin silt loam	98	IIIw-2	11
MrA3	Murrill gravelly clay loam, 0 to 3 percent slopes, severely eroded	99	IIe-1	9
MuA	Murrill gravelly loam, 0 to 3 percent slopes	99	I-1	8
MuB2	Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded	99	IIe-1	9
MuC2	Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded	99	IIIe-1	10
MvB	Murrill very stony loam, 0 to 8 percent slopes	100	VIs-1	12
MvC	Murrill very stony loam, 8 to 25 percent slopes	100	VIs-1	12
NaC3	Neshaminy silty clay loam, 8 to 15 percent slopes, severely eroded	100	IVe-1	11
NaD3	Neshaminy silty clay loam, 15 to 25 percent slopes, severely eroded	100	VIe-1	12

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page
NeB2	Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded	100	IIe-1	9
NeC2	Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded	101	IIIe-1	10
NsD	Neshaminy very stony silt loam, 5 to 25 percent slopes	101	VIs-1	12
NsF	Neshaminy very stony silt loam, 25 to 60 percent slopes	101	VIIs-1	13
PeB2	Penn shaly soils, 3 to 8 percent slopes, moderately eroded	101	IIe-5	9
PeC2	Penn shaly soils, 8 to 15 percent slopes, moderately eroded	101	IIIe-3	10
PeD2	Penn shaly soils, 15 to 25 percent slopes, moderately eroded	102	IVe-3	12
Ph	Philo loam, coal overwash	102	IIw-2	10
Pl	Philo silt loam	102	IIw-2	10
Po	Pope silt loam	103	I-2	8
RaB	Raritan silt loam, 0 to 5 percent slopes	104	IIw-1	10
ReA	Readington silt loam, 0 to 3 percent slopes	104	IIw-1	10
ReB2	Readington silt loam, 3 to 8 percent slopes, moderately eroded	104	IIe-4	9
RlA2	Reaville shaly silt loam, 0 to 3 percent slopes, moderately eroded	105	IIIw-1	11
RlB2	Reaville shaly silt loam, 3 to 8 percent slopes, moderately eroded	105	IIIw-1	11
Ro	Rowland silt loam	106	IIw-2	10
Ru	Rubble land	106	VIIIs-1	13
RyA2	Ryder silt loam, 0 to 3 percent slopes, moderately eroded	107	IIs-2	10
RyB2	Ryder silt loam, 3 to 8 percent slopes, moderately eroded	107	IIe-5	9
RyC3	Ryder silt loam, 8 to 15 percent slopes, severely eroded	107	IVe-3	12
WaA2	Washington silt loam, 0 to 3 percent slopes, moderately eroded	107	I-1	8
WaB2	Washington silt loam, 3 to 8 percent slopes, moderately eroded	108	IIe-1	9
WaC2	Washington silt loam, 8 to 15 percent slopes, moderately eroded	108	IIIe-1	10
WcA	Watson silt loam, 0 to 3 percent slopes	108	IIw-1	10
WeB2	Weikert-Berks shaly silt loams, 3 to 8 percent slopes, moderately eroded	109	IIe-5	9
WeC2	Weikert-Berks shaly silt loams, 8 to 15 percent slopes, moderately eroded	109	IIIe-4	11
WeD2	Weikert-Berks shaly silt loams, 15 to 25 percent slopes, moderately eroded	109	VIe-2	12
WeF2	Weikert-Berks shaly silt loams, 25 to 60 percent slopes, moderately eroded	110	VIIe-2	13
WsA	Wiltshire silt loam, 0 to 3 percent slopes	110	IIw-1	10
WsB2	Wiltshire silt loam, 3 to 8 percent slopes, moderately eroded	110	IIe-3	9

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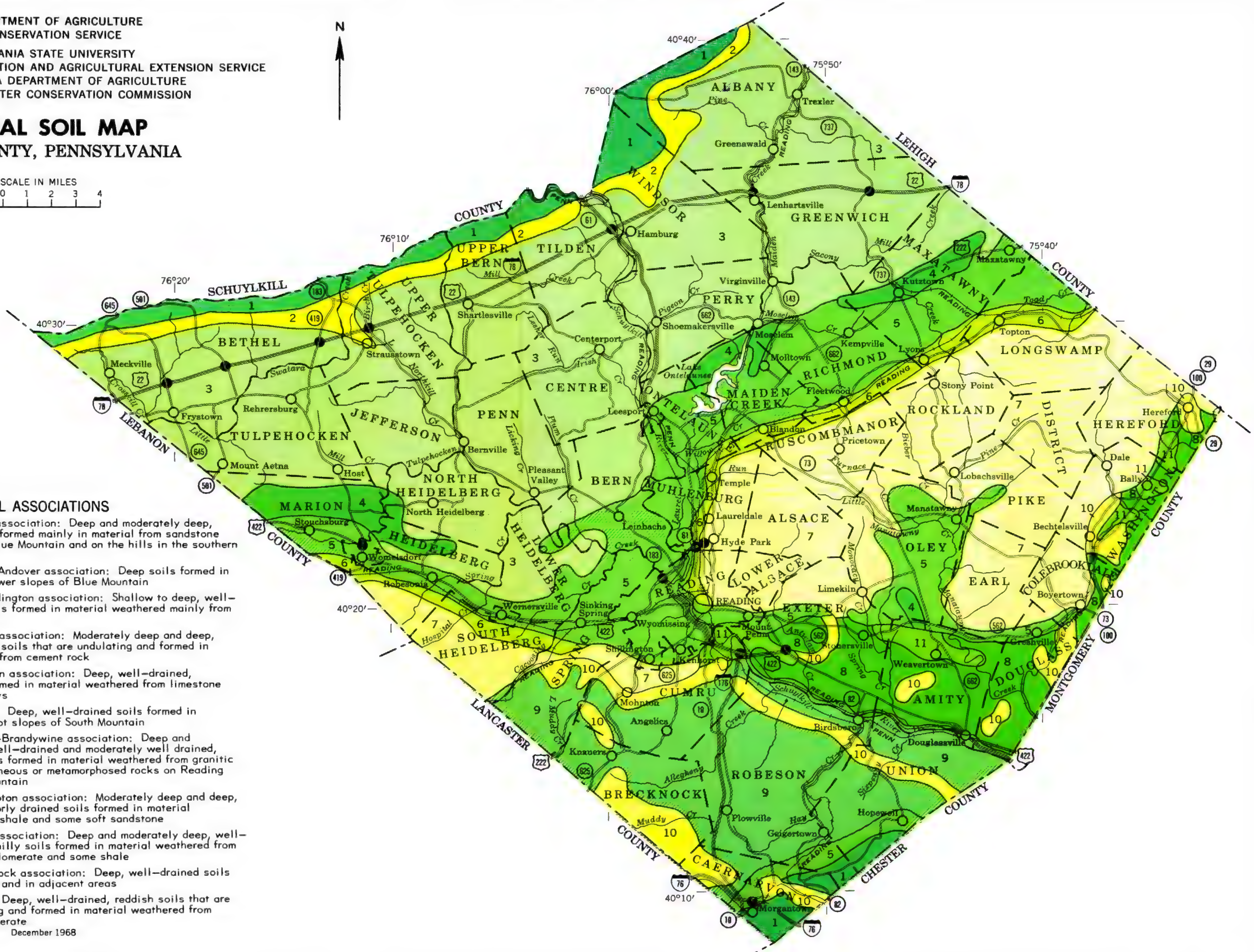
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PENNSYLVANIA STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION AND AGRICULTURAL EXTENSION SERVICE
AND PENNSYLVANIA DEPARTMENT OF AGRICULTURE
STATE SOIL AND WATER CONSERVATION COMMISSION

GENERAL SOIL MAP

BERKS COUNTY, PENNSYLVANIA



SOIL ASSOCIATIONS

1 — Edgemont-Dekalb association: Deep and moderately deep, well-drained soils formed mainly in material from sandstone and quartzite; on Blue Mountain and on the hills in the southern part of the county

2 — Laidig-Buchanan-Andover association: Deep soils formed in colluvium on the lower slopes of Blue Mountain

3 — Berks-Weikert-Bedington association: Shallow to deep, well-drained, rolling soils formed in material weathered mainly from shale and siltstone

4 — Ryder-Fogelsville association: Moderately deep and deep, well-drained, silty soils that are undulating and formed in material weathered from cement rock

5 — Duffield-Washington association: Deep, well-drained, undulating soils formed in material weathered from limestone in limestone valleys

6 — Murrill association: Deep, well-drained soils formed in colluvium on the foot slopes of South Mountain

7 — Chester-Glenville-Brandywine association: Deep and moderately deep, well-drained and moderately well drained, rolling to hilly soils formed in material weathered from granitic gneiss and other igneous or metamorphosed rocks on Reading Hills and South Mountain

8 — Penn-Reaville-Croton association: Moderately deep and deep, well-drained to poorly drained soils formed in material weathered from red shale and some soft sandstone

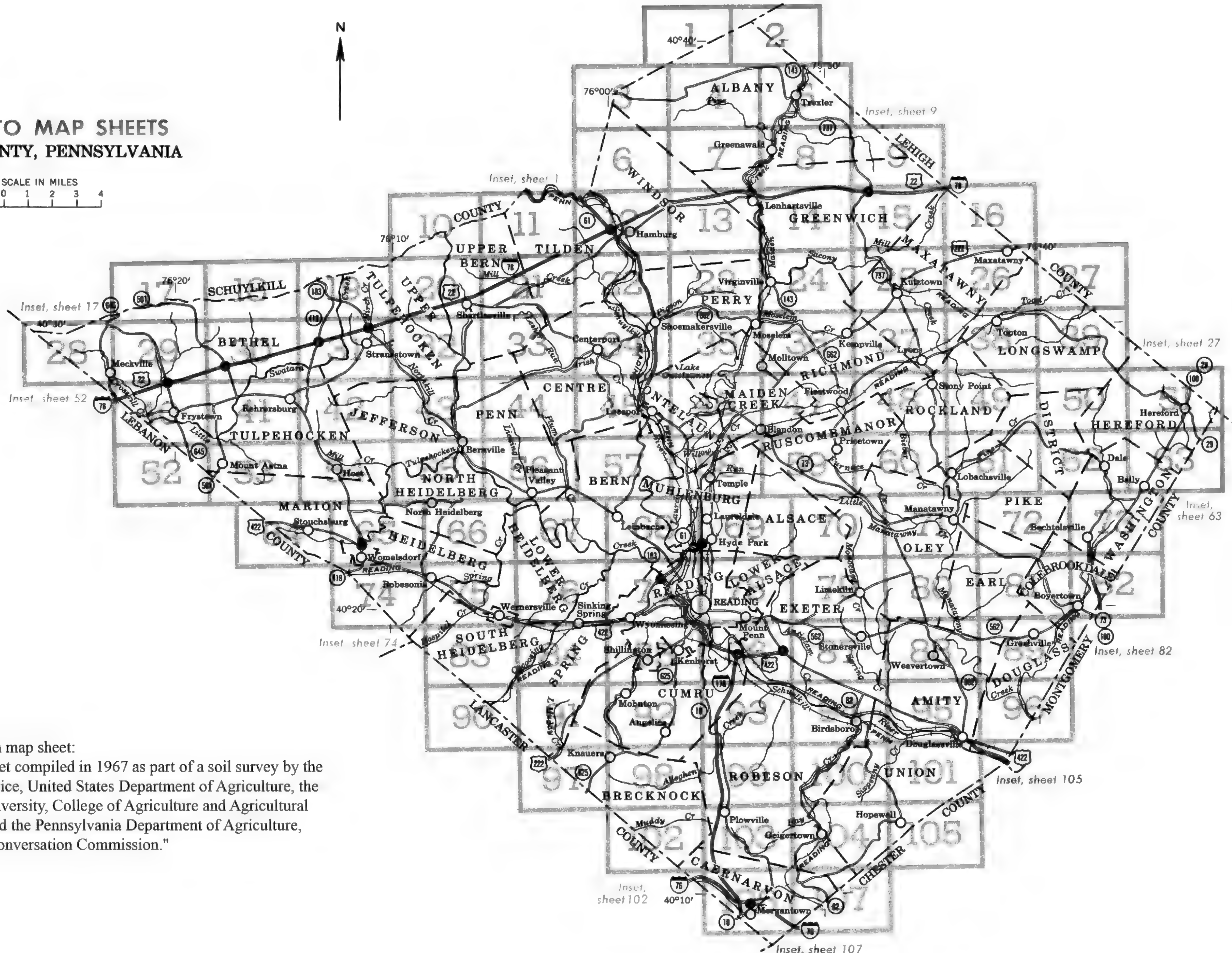
9 — Lewisberry-Penn association: Deep and moderately deep, well-drained, rolling to hilly soils formed in material weathered from red sandstone conglomerate and some shale

10 — Neshaminy-Brecknock association: Deep, well-drained soils on ironstone ridges and in adjacent areas

11 — Athol association: Deep, well-drained, reddish soils that are undulating or rolling and formed in material weathered from calcareous conglomerate

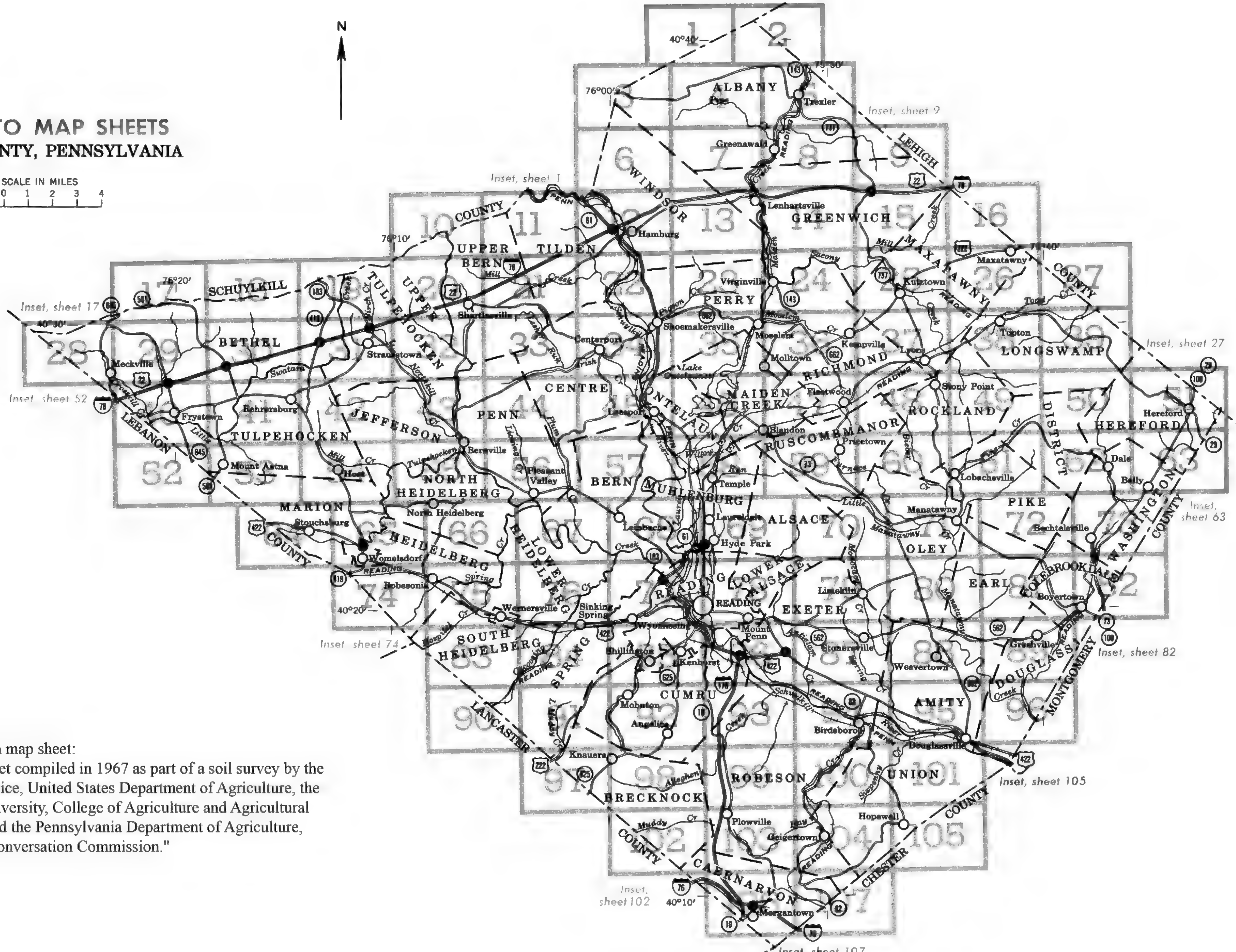
December 1968

INDEX TO MAP SHEETS
BERKS COUNTY, PENNSYLVANIA



Original text from each map sheet:
"This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the Pennsylvania State University, College of Agriculture and Agricultural Experiment Station, and the Pennsylvania Department of Agriculture, State Soil and Water Conversation Commission."

INDEX TO MAP SHEETS
BERKS COUNTY, PENNSYLVANIA



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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

BERKS COUNTY, PENNSYLVANIA

PENNSYLVANIA STATE UNIVERSITY, COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
PENNSYLVANIA DEPARTMENT OF AGRICULTURE
STATE SOIL AND WATER CONSERVATION COMMISSION

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level soils but some are for soils or land types that have a considerable range of slope. A final number, 2 or 3, in the symbol, shows that the soil is moderately eroded or severely eroded.

SYMBOL	NAME
AgB	Allenwood gravelly silt loam, 2 to 8 percent slopes
AnB	Andover very stony loam, 0 to 8 percent slopes
AsB2	Athol silt loam, 3 to 8 percent slopes, moderately eroded
AsC2	Athol silt loam, 8 to 15 percent slopes, moderately eroded
AsC3	Athol silt loam, 8 to 15 percent slopes, severely eroded
AsD3	Athol silt loam, 15 to 25 percent slopes, severely eroded
AtD	Athol very stony and rocky silt loam, 8 to 25 percent slopes
Au	Atkins silt loam
Ba	Baile silt loam
Bd	Baile very stony silt loam
BeB2	Bedington shaly silt loam, 3 to 8 percent slopes, moderately eroded
BeC2	Bedington shaly silt loam, 8 to 15 percent slopes, moderately eroded
BeD2	Bedington shaly silt loam, 15 to 25 percent slopes, moderately eroded
BkA2	Berks shaly silt loam, 0 to 3 percent slopes, moderately eroded
BkB2	Berks shaly silt loam, 3 to 8 percent slopes, moderately eroded
BkC2	Berks shaly silt loam, 8 to 15 percent slopes, moderately eroded
BkD2	Berks shaly silt loam, 15 to 25 percent slopes, moderately eroded
BkE2	Berks shaly silt loam, 25 to 35 percent slopes, moderately eroded
BlB	Birdsboro silt loam, 2 to 10 percent slopes
BmB	Birdsboro-Duffield silt loams, 3 to 10 percent slopes
Bo	Bowmansville silt loam
BrB 2	Brandywine channery loam, 3 to 8 percent slopes, moderately eroded
BrC2	Brandywine channery loam, 8 to 15 percent slopes, moderately eroded
BrD2	Brandywine channery loam, 15 to 25 percent slopes, moderately eroded
BsB	Brecknock channery silt loam, 3 to 8 percent slopes
BsC2	Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded
BsD3	Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded
BtB	Brecknock very stony silt loam, 0 to 8 percent slopes
BtD	Brecknock very stony silt loam, 8 to 25 percent slopes
BtF	Brecknock very stony silt loam, 25 to 60 percent slopes
BuA	Brinkerton silt loam, 0 to 3 percent slopes
BuB2	Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded
BvB	Buchanan gravelly loam, 3 to 8 percent slopes
BwB	Buchanan very stony loam, 0 to 8 percent slopes
By	Burgin silt loam, gray surface variant
ChB2	Chester channery silt loam, 3 to 8 percent slopes, moderately eroded
ChC2	Chester channery silt loam, 8 to 15 percent slopes, moderately eroded
ChC3	Chester channery silt loam, 8 to 15 percent slopes, severely eroded
ChD2	Chester channery silt loam, 15 to 25 percent slopes, moderately eroded
ChE3	Chester channery silt loam, 15 to 30 percent slopes, severely eroded
CnB	Chester very stony silt loam, 0 to 8 percent slopes
CnD	Chester very stony silt loam, 8 to 25 percent slopes
CnF	Chester very stony silt loam, 25 to 55 percent slopes
CoA	Comly silt loam, 0 to 3 percent slopes
CoB2	Comly silt loam, 3 to 8 percent slopes, moderately eroded
CrA	Croton silt loam, 0 to 3 percent slopes
CrB2	Croton silt loam, 3 to 8 percent slopes, moderately eroded

SYMBOL	NAME
DfA	Duffield silt loam, 0 to 3 percent slopes
DfB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded
DfC2	Duffield silt loam, 8 to 15 percent slopes, moderately eroded
DfD2	Duffield silt loam, 15 to 25 percent slopes, moderately eroded
DhC3	Duffield and Hagerstown soils, 8 to 15 percent slopes, severely eroded
DhE3	Duffield and Hagerstown soils, 15 to 30 percent slopes, severely eroded
EcB2	Edgemont channery loam, 3 to 8 percent slopes, moderately eroded
EcC2	Edgemont channery loam, 8 to 15 percent slopes, moderately eroded
EcD2	Edgemont channery loam, 15 to 25 percent slopes, moderately eroded
EdB	Edgemont and Dekalb very stony sandy loams, 0 to 8 percent slopes
EdD	Edgemont and Dekalb very stony sandy loams, 8 to 25 percent slopes
EdF	Edgemont and Dekalb very stony sandy loams, 25 to 70 percent slopes
FoA	Fogelsville silt loam, 0 to 3 percent slopes
FoB2	Fogelsville silt loam, 3 to 8 percent slopes, moderately eroded
FoC2	Fogelsville silt loam, 8 to 15 percent slopes, moderately eroded
GlA	Glenville silt loam, 0 to 3 percent slopes
GlB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded
KlB2	Klinesville shaly silt loam, 3 to 8 percent slopes,moderately eroded
KlC2	Klinesville shaly silt loam, 8 to 15 percent slopes, moderately eroded
KlD2	Klinesville shaly silt loam, 15 to 25 percent slopes, moderately eroded
KlF2	Klinesville shaly silt loam, 25 to 45 percent slopes, moderately eroded
LaB2	Laidig channery loam, 3 to 8 percent slopes, moderately eroded
LaC2	Laidig channery loam, 8 to 15 percent slopes, moderately eroded
LdB	Laidig very stony loam, 0 to 8 percent slopes
LdD	Laidig very stony loam, 8 to 25 percent slopes
Lg	Lamington silt loam
LhA	Lehigh silt loam, 0 to 3 percent slopes
LhB2	Lehigh silt loam, 3 to 8 percent slopes, moderately eroded
LhC3	Lehigh silt loam, 8 to 15 percent slopes, severely eroded
LrB2	Lewisberry gravelly sandy loam, 3 to 8 percent slopes, moderately eroded
LrC2	Lewisberry gravelly sandy loam, 8 to 15 percent slopes, moderately eroded
LrC3	Lewisberry gravelly sandy loam, 8 to 15 percent slopes, severely eroded
LrD2	Lewisberry gravelly sandy loam, 15 to 25 percent slopes, moderately eroded
LrD3	Lewisberry gravelly sandy loam, 15 to 25 percent slopes, severely eroded
LrE3	Lewisberry gravelly sandy loam, 25 to 35 percent slopes, severely eroded
LsB	Lewisberry very stony sandy loam, 0 to 8 percent slopes
LsD	Lewisberry very stony sandy loam, 8 to 25 percent slopes
LsF	Lewisberry very stony sandy loam, 25 to 60 percent slopes
Lt	Lindside silt loam

SYMBOL	NAME
LzB2	Litz shaly silt loam, 3 to 8 percent slopes, moderately eroded
LzC2	Litz shaly silt loam, 8 to 15 percent slopes, moderately eroded
LzD2	Litz shaly silt loam, 15 to 25 percent slopes, moderately eroded
LzE3	Litz shaly silt loam, 15 to 30 percent slopes, severely eroded
MaB	Made land, granite and gneiss materials, sloping
MaD	Made land, granite and gneiss materials, strongly sloping
MdB	Made land, limestone materials, sloping
MdD	Made land, limestone materials, strongly sloping
MeB	Made land, shale and sandstone materials, sloping
Ml	Melvin silt loam
MrA3	Murrill gravelly clay loam, 0 to 3 percent slopes, severely eroded
MuA	Murrill gravelly loam, 0 to 3 percent slopes
MuB2	Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded
MuC2	Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded
MvB	Murrill very stony loam, 0 to 8 percent slopes
MvC	Murrill very stony loam, 8 to 25 percent slopes
NaC3	Neshaminy silty clay loam, 8 to 15 percent slopes, severely eroded
NaD3	Neshaminy silty clay loam, 15 to 25 percent slopes, severely eroded
NeB2	Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded
NeC2	Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded
NsD	Neshaminy very stony silt loam, 5 to 25 percent slopes
NsF	Neshaminy very stony silt loam, 25 to 60 percent slopes
PeB2	Penn shaly soils, 3 to 8 percent slopes, moderately eroded
PeC2	Penn shaly soils, 8 to 15 percent slopes, moderately eroded
PeD2	Penn shaly soils, 15 to 25 percent slopes, moderately eroded
Ph	Philo loam, coal overwash
Pl	Philo silt loam
Po	Pope silt loam
RaB	Raritan silt loam, 0 to 5 percent slopes
ReA	Readington silt loam, 0 to 3 percent slopes
ReB2	Readington silt loam, 3 to 8 percent slopes, moderately eroded
RlA2	Reaville shaly silt loam, 0 to 3 percent slopes, moderately eroded
RlB2	Reaville shaly silt loam, 3 to 8 percent slopes, moderately eroded
Ro	Rowland silt loam
Ru	Rubble land
RyA2	Ryder silt loam, 0 to 3 percent slopes, moderately eroded
RyB2	Ryder silt loam, 3 to 8 percent slopes, moderately eroded
RyC3	Ryder silt loam, 8 to 15 percent slopes, severely eroded
WaA2	Washington silt loam, 0 to 3 percent slopes, moderately eroded
WaB2	Washington silt loam, 3 to 8 percent slopes, moderately eroded
WaC2	Washington silt loam, 8 to 15 percent slopes, moderately eroded
WcA	Watson silt loam, 0 to 3 percent slopes
WeB2	Weikert-Berks shaly silt loams, 3 to 8 percent slopes, moderately eroded
WeC2	Weikert-Berks shaly silt loams, 8 to 15 percent slopes, moderately eroded
WeD2	Weikert-Berks shaly silt loams, 15 to 25 percent slopes, moderately eroded
WeF2	Weikert-Berks shaly silt loams, 25 to 60 percent slopes, moderately eroded
WsA	Wiltshire silt loam, 0 to 3 percent slopes
WsB2	Wiltshire silt loam, 3 to 8 percent slopes, moderately eroded

Soil map constructed 1967 by Cartographic Division, Soil Conservation Service, USDA, from 1964 aerial photographs. Controlled mosaic based on Pennsylvania plane coordinate system, south zone, Lambert conformal conic projection, 1927 North American datum.

BERKS COUNTY, PENNSYLVANIA
CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail, road, pack, or foot

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferry — FY
- Ford — FORD
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mines and Quarries

Pit, gravel

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches — CANAL

Lakes and ponds
- Perennial — water, w
- Intermittent

Abandoned canal — ABANDONED CANAL

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

Prominent peak

Depressions, unclassified — Large, Small

SOIL SURVEY DATA

- Soil boundary and symbol — Dx
- Gravel
- Stony, very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully


1
N
SCHUYLKILL COUNTY
SCHUYLKILL RIVER
READING
PENNSYLVANIA
TILDEN
(Joins sheet 11)
BLUE MOUNTAIN
SCHUYLKILL COUNTY
APPALACHIAN TRAIL
STATE GAME LANDS NO. 106
ALBANY
EdD
Ru
LdD
LaC2
AnB
Ph
Pl
(Joins sheet 2)
(Joins sheet 3)
(Joins sheet 4)
0
1 Mile
Scale 1:15 840
0
5000 Feet

2

(Joins sheet 4) | (Joins sheet 5)

0 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 1)

3

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 4

4

(Joins sheet 1) (Joins sheet 2)

(Joins sheet 3) (Joins sheet 5)

(Joins sheet 7)

0 ½ 1 Mile

Scale 1:15 840

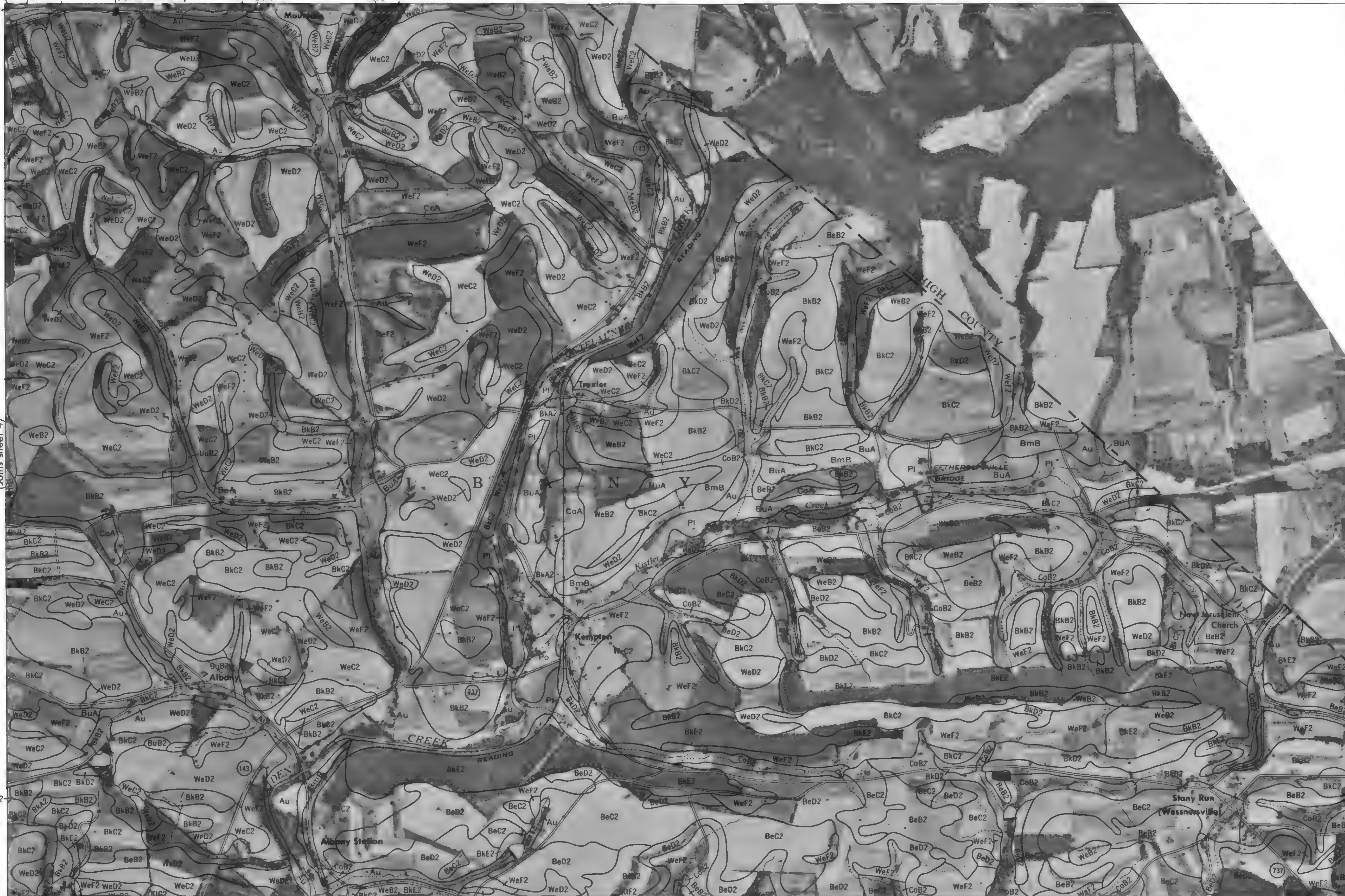
0 5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 5

(5)

(Joins sheet 2)

(Joins sheet 4)



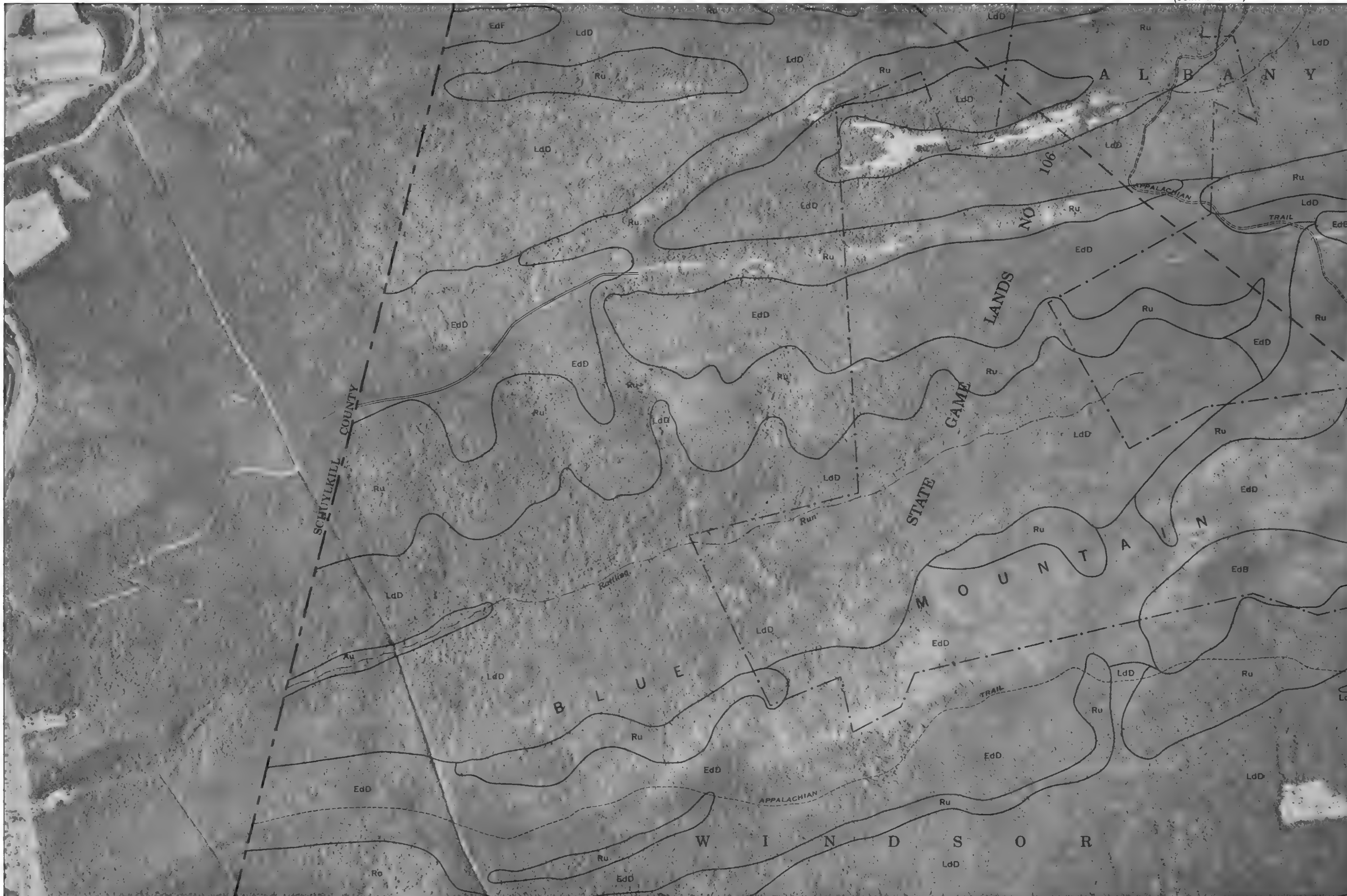
(Joins inset, sheet 9)

(Joins sheet 8)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

6

(Joins sheet 3)



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(Joins sheet 12)

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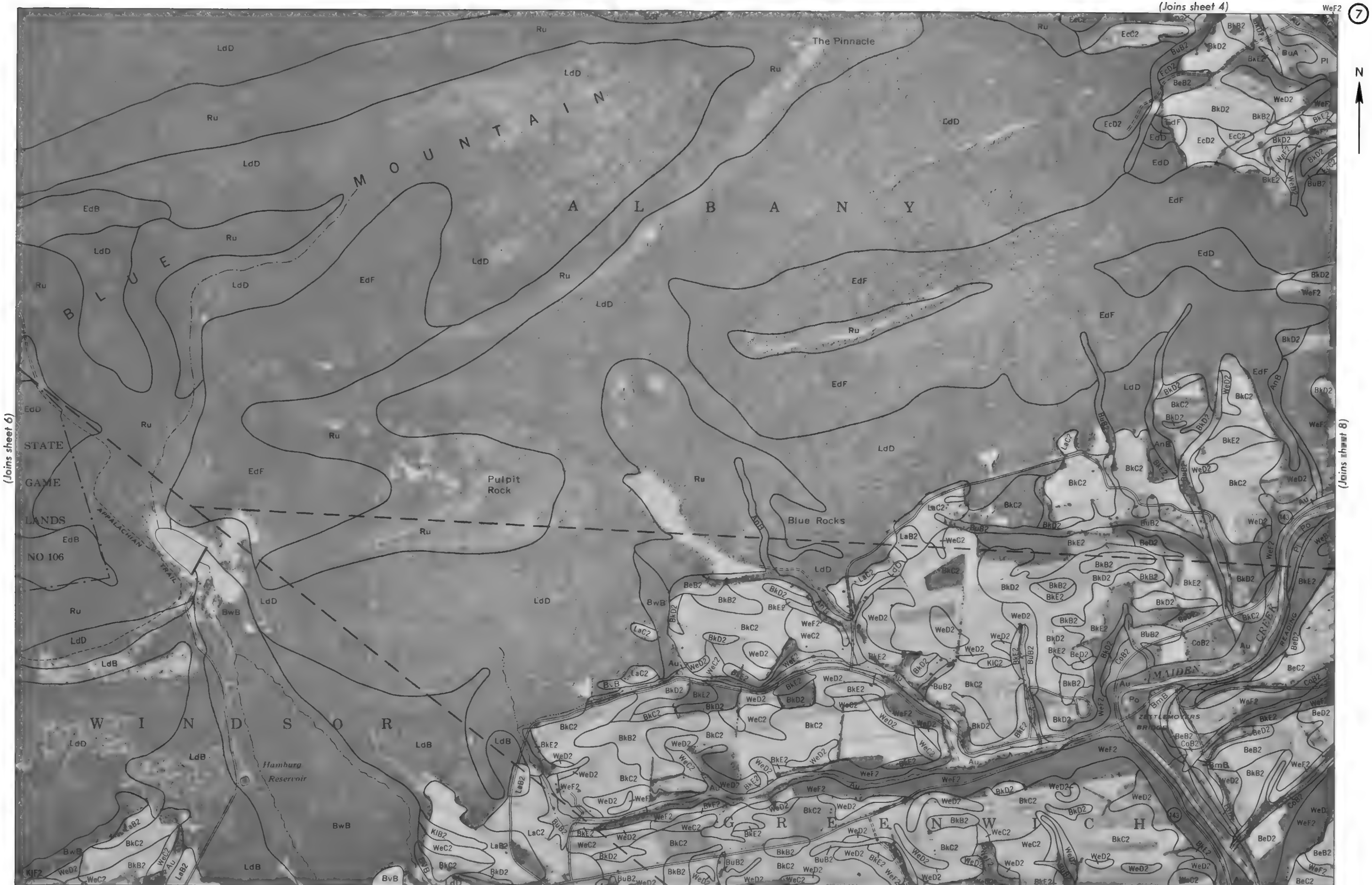
BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 7



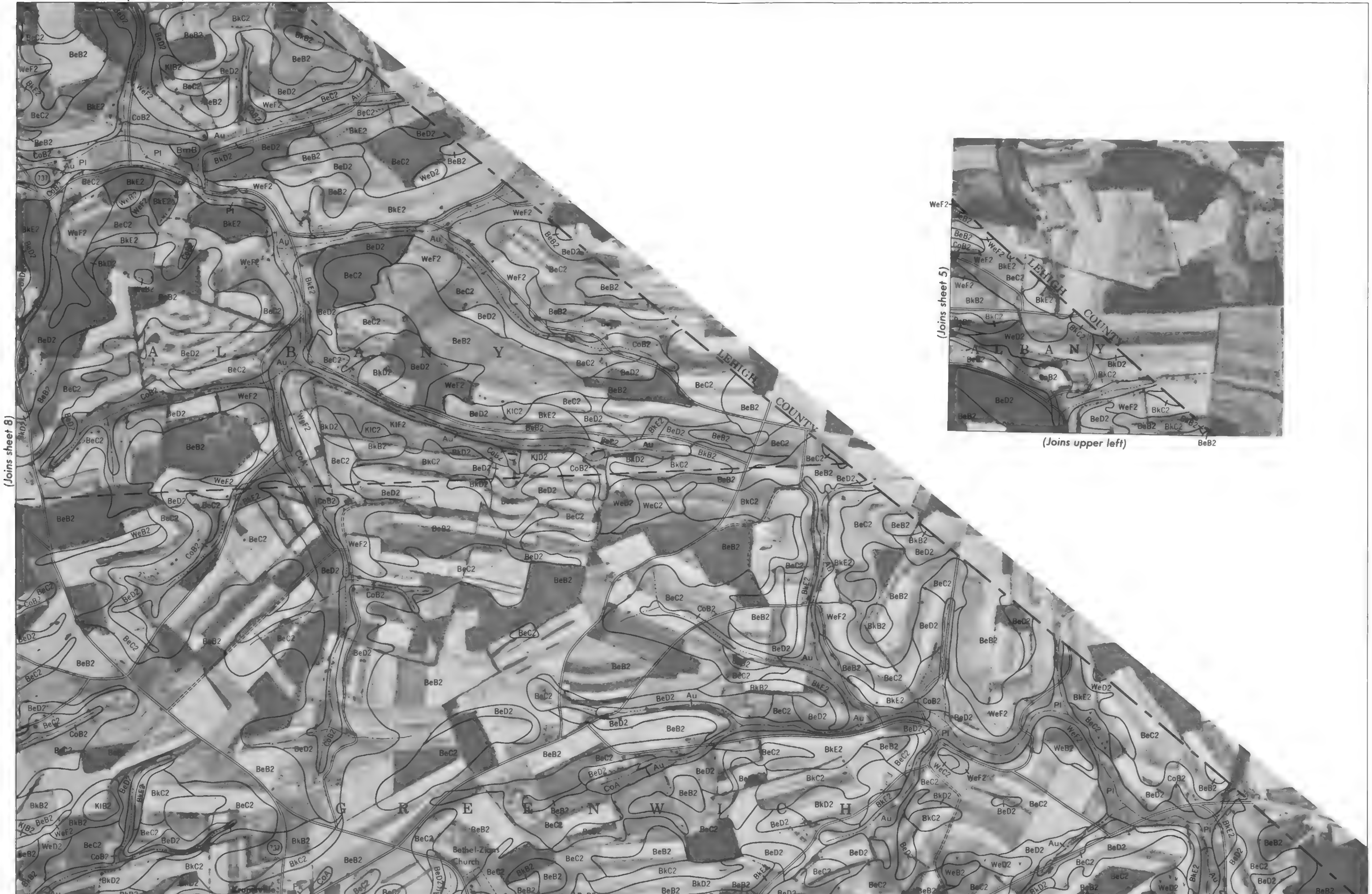
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 8

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

9

(Joins inset)



(Joins upper left)

N

(Joins sheet 15)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

10

N

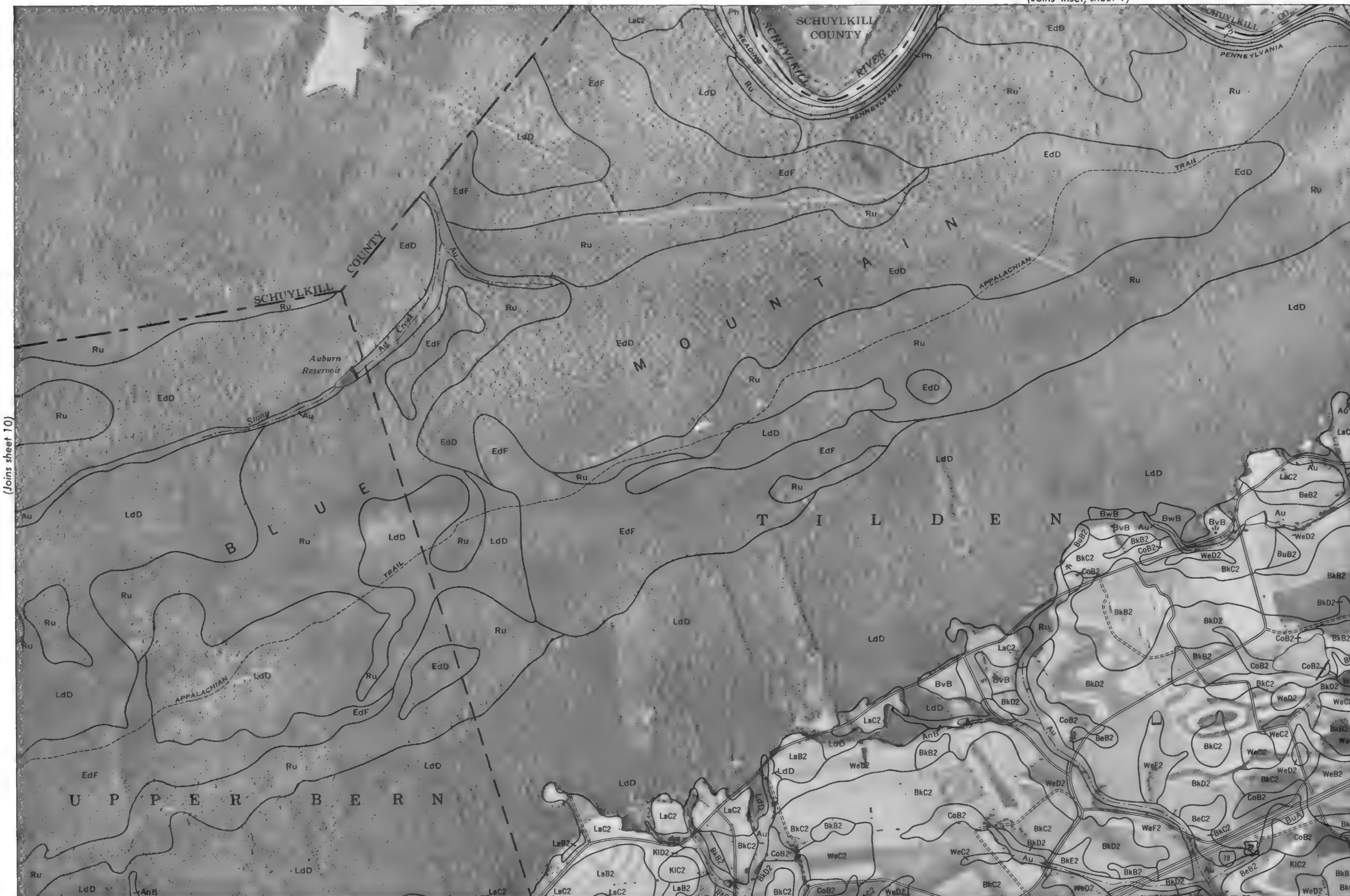
(Joins sheet 20)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins inset, sheet 1)

11

(Joins sheet 10)



(Joins sheet 12)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

KlF2 BkE2 (Joins sheet 21)

12

(Joins sheet 6)

(Joins sheet 11)

(Joins sheet 13)

(Joins sheet 22)

0 ½ 1 Mile

Scale 1:15 840

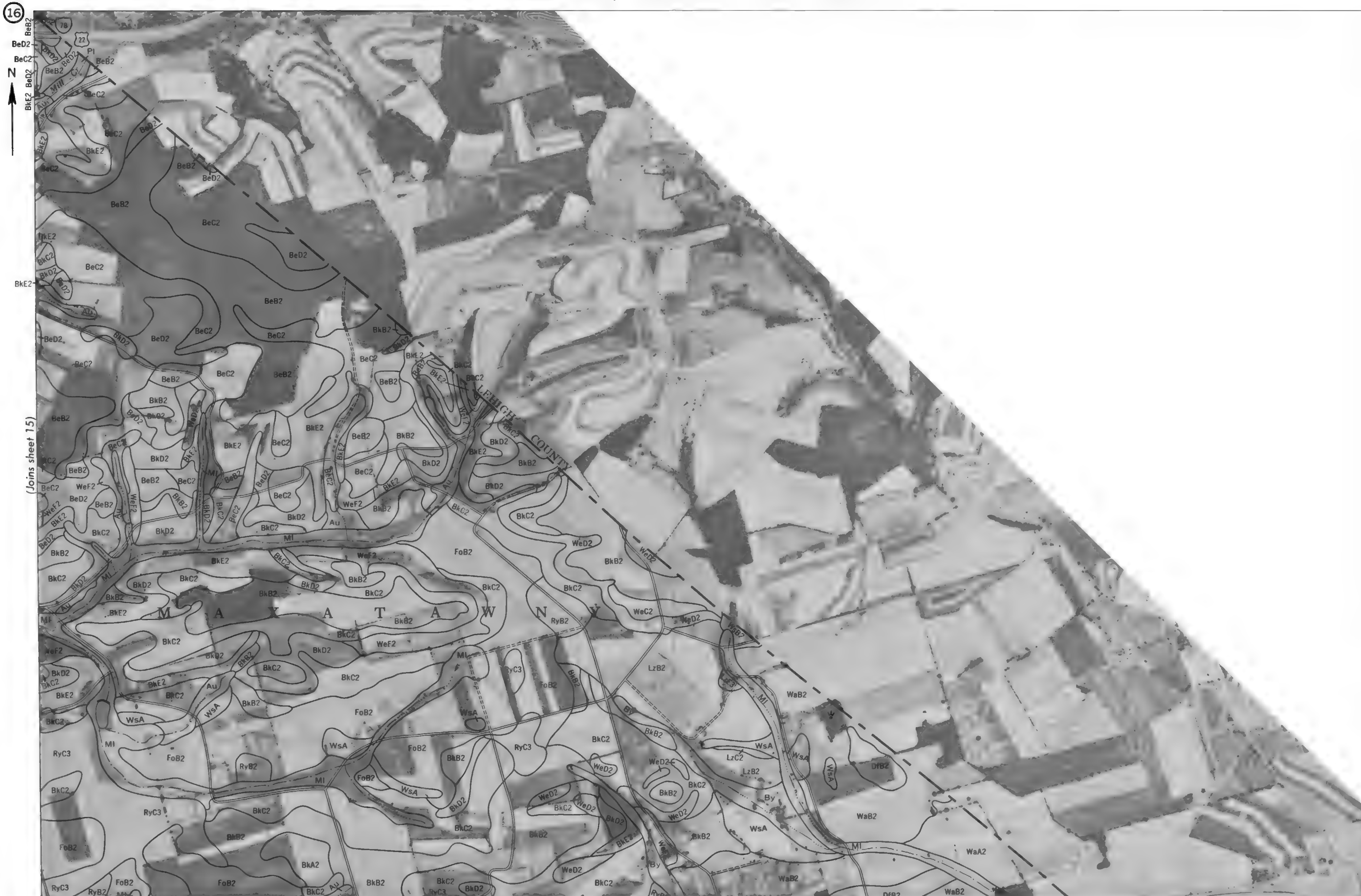
0 5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 13

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 14


15
(Joins sheet 9)
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 25)
N
Krumsville
Grimville
Greenwich-Lenhartsville School
G R E E N W I C H
M A X A T A W N Y
Mill Creek Corner
Eagle Point
Dietrichs Mill Bridge
Mill Creek
Bund Creek
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

16



(Joins sheet 26)

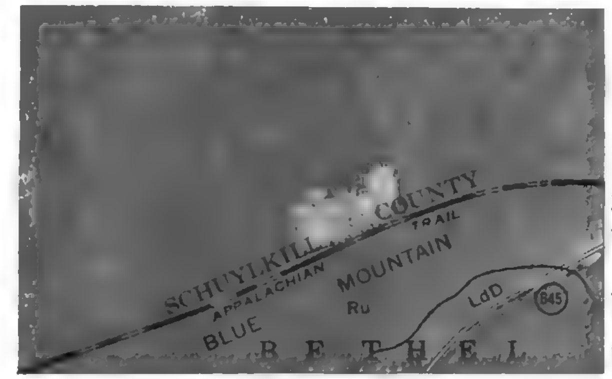
0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

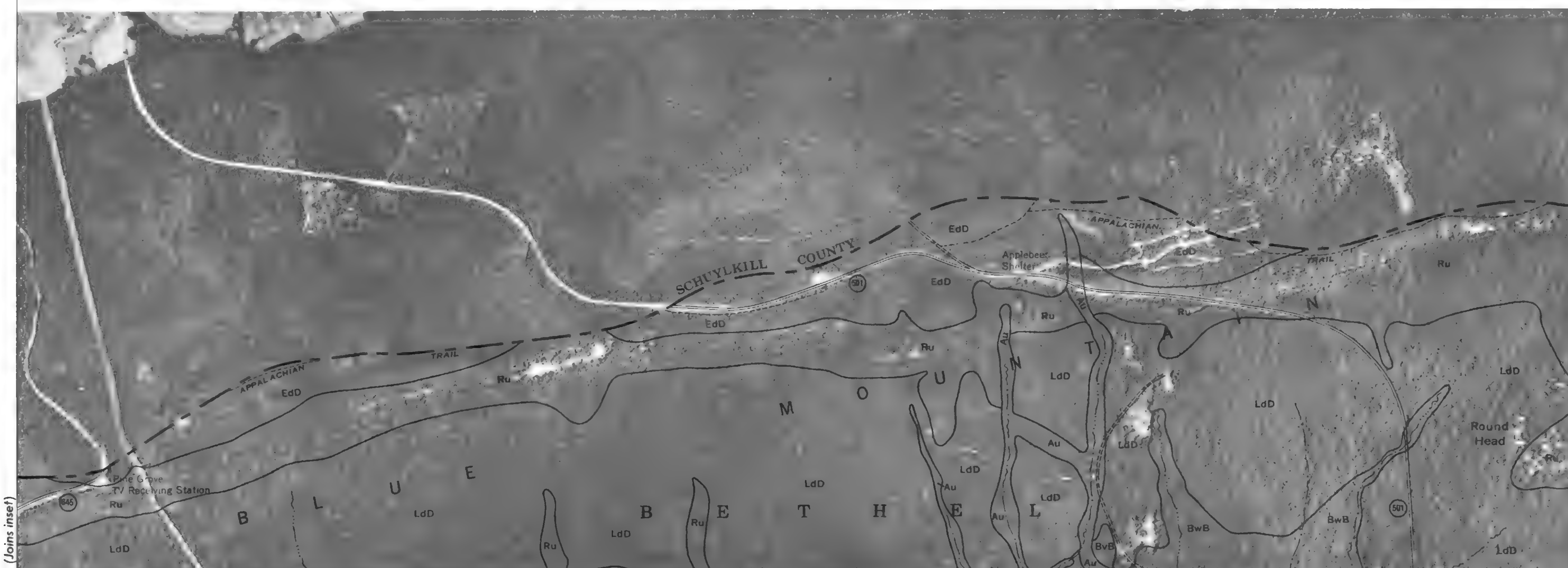
17

N



(Joins lower left)

(Joins sheet 28)

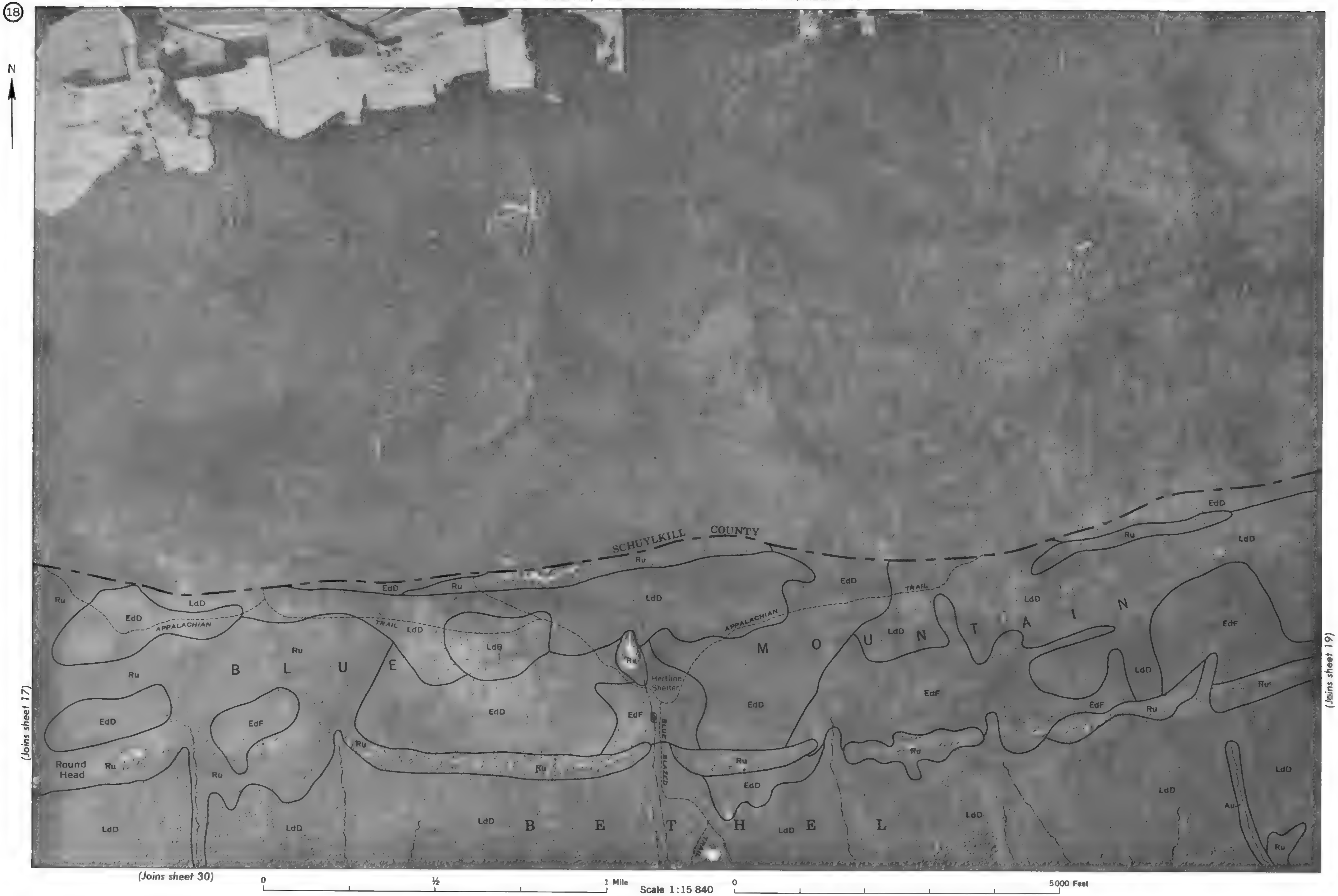


(Joins inset)

(Joins sheet 18)

(Joins sheet 29)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

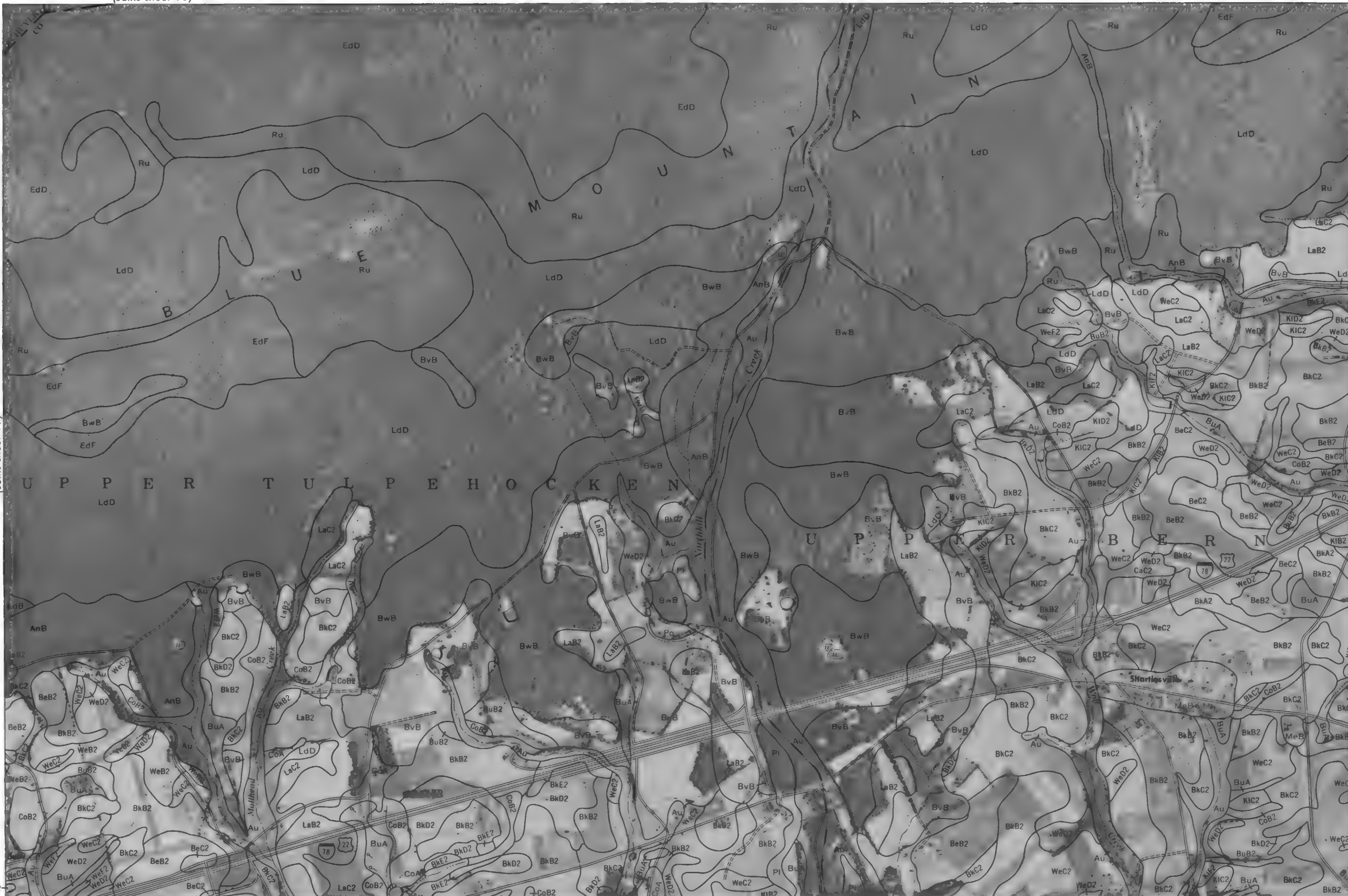

18
N
SCHUYLKILL COUNTY
APPALACHIAN TRAIL
BLUE MOUNTAIN
BETHEL
Hertline Shelter
BLUE BLAZED TRAIL
Round Head
Ru
EdD
LdD
LdB
EdF
Au
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 30)
0
½
1 Mile
Scale 1:15 840
0
5000 Feet


19
N
SCHUYLKILL COUNTY
APPALACHIAN TRAIL
BLUE MOUNTAIN
UPPER TULPEHOCKEN
BETHEL
Stone Creek
Little Swatara Creek
Jackson Creek
Birch Creek
183
419
EdD
EdF
EdB
EdB2
LdD
LdB
LaC2
LaB2
Ru
BwB
BvB
AnB
Au
BuA
WeB2
WeC2
WeD2
WeF2
BeB2
BkB2
BkC2
BkD2
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 31)
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

20

(Joins sheet 10)

N



(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 32)

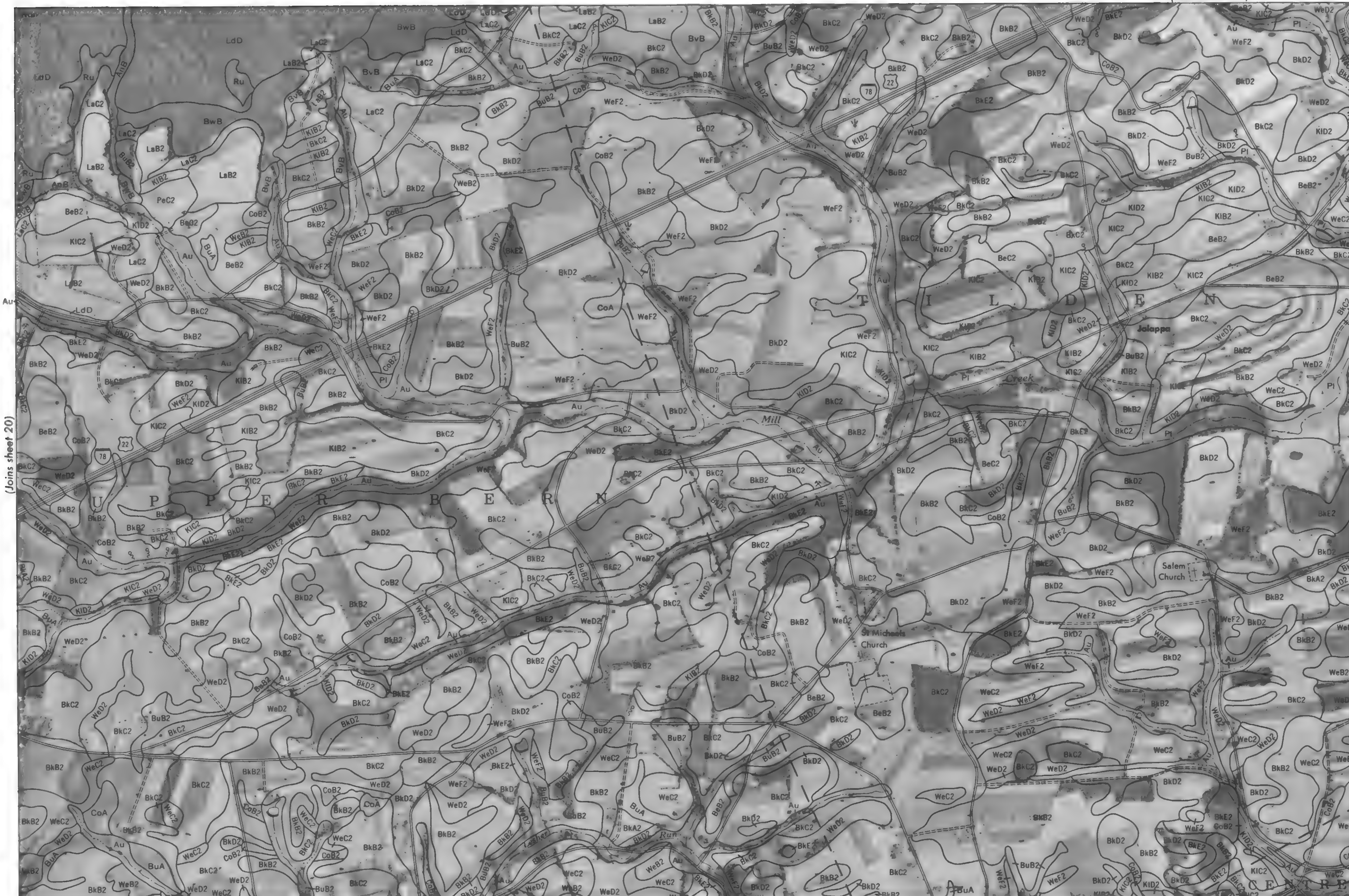
0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

21

(Joins sheet 11)

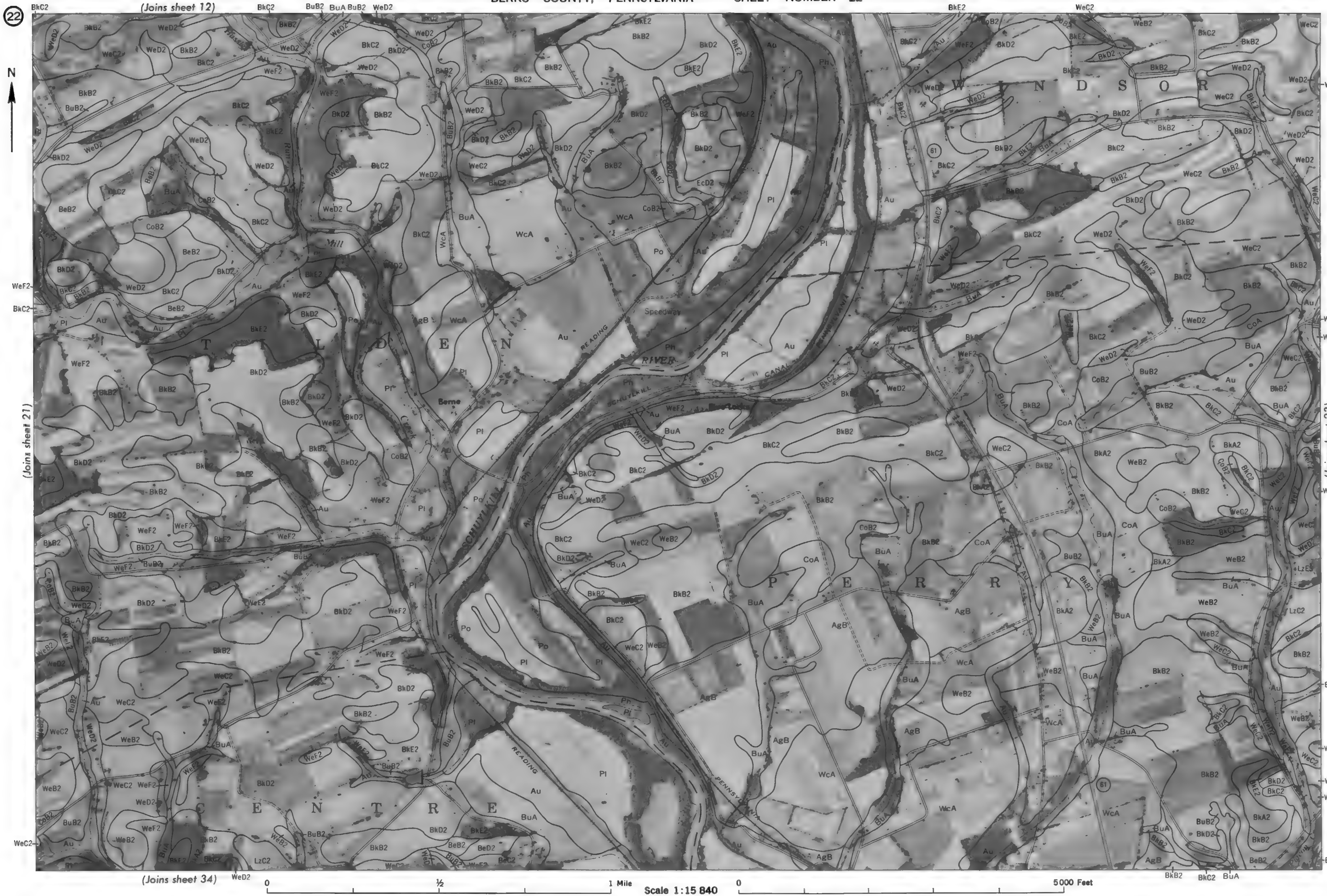


(Joins sheet 20)

(Joins sheet 22)

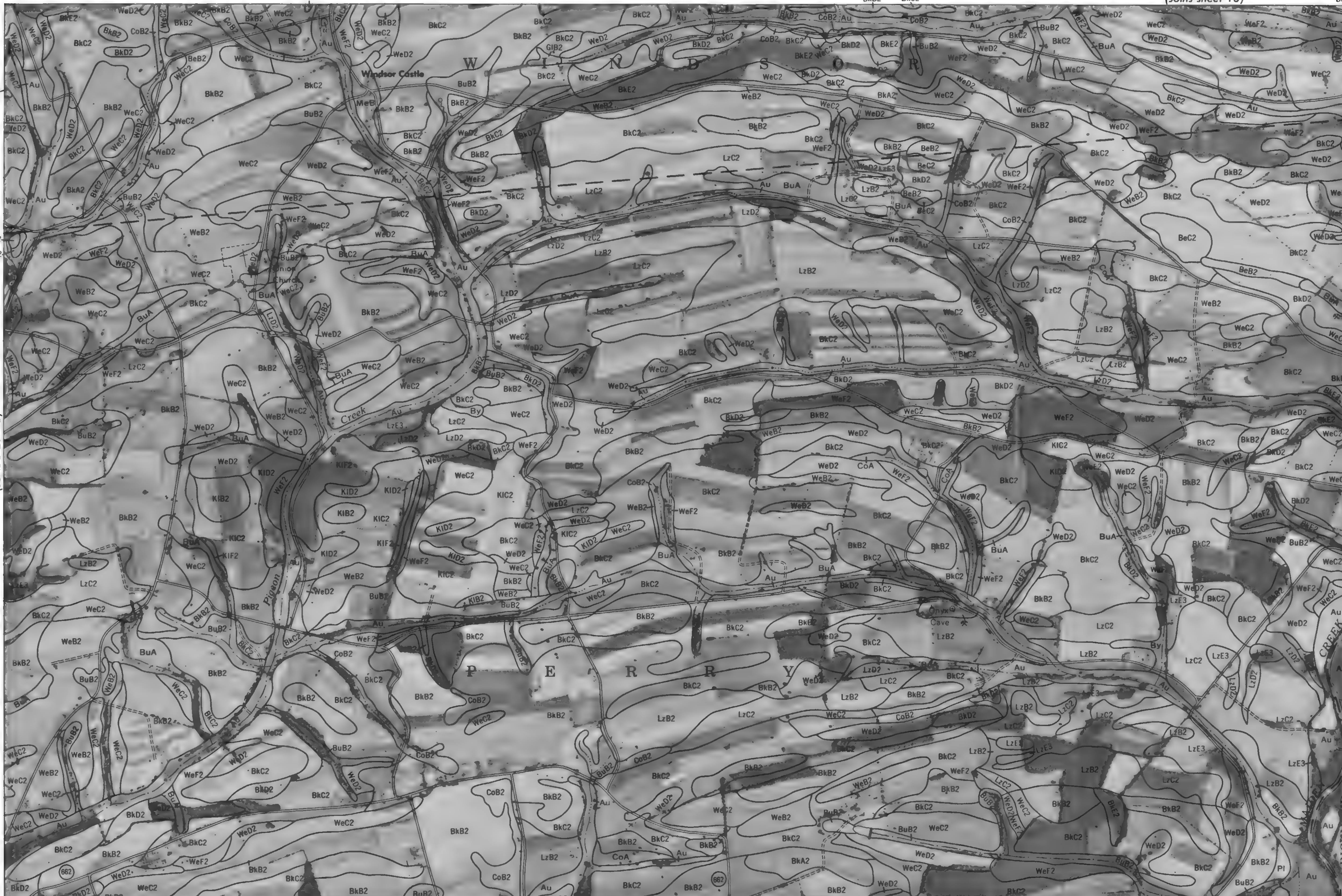
(Joins sheet 33)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


22
N
(Joins sheet 12)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 34)
W I N D S O R
T I L D E N
P E R R Y
C E N T R E
SCHUYLKILL
RIVER
READING
PENNSYLVANIA
CANAL
Speedway
Berne
Mill
Creek
61
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

(Joins sheet 13)

23

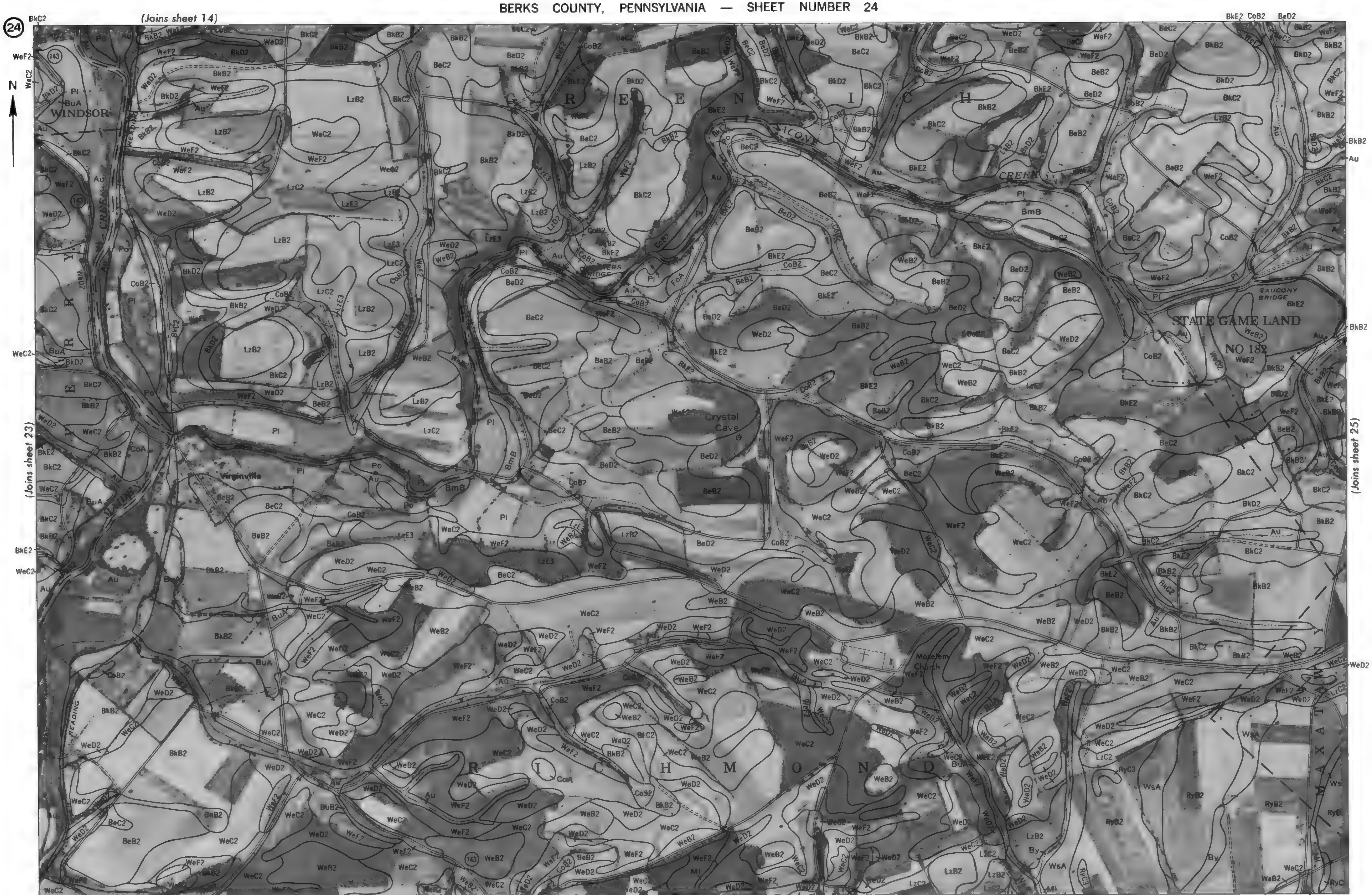


(Joins sheet 22)

(Joins sheet 24)

(Joins sheet 35)

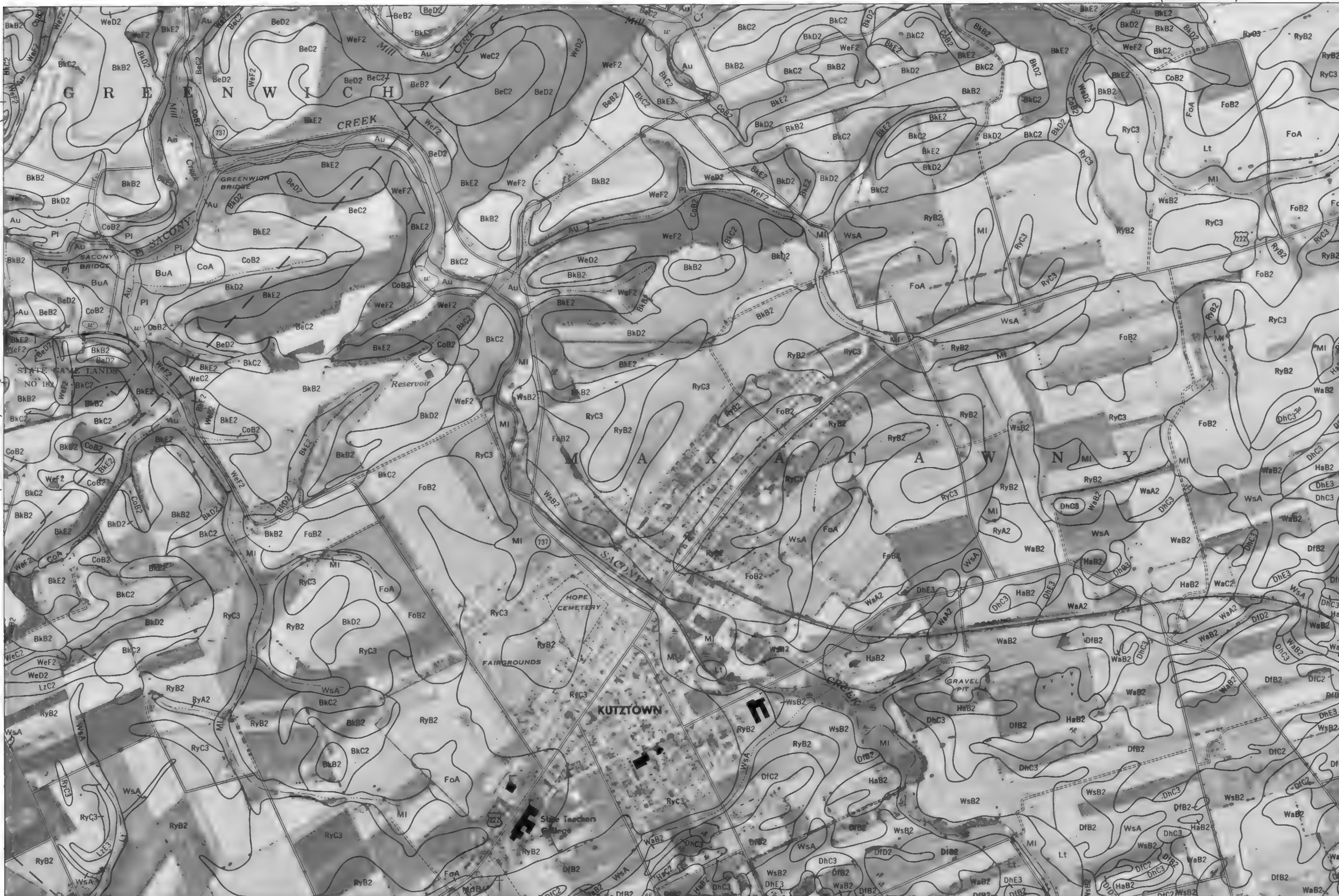
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 15)

(Joins sheet 24)

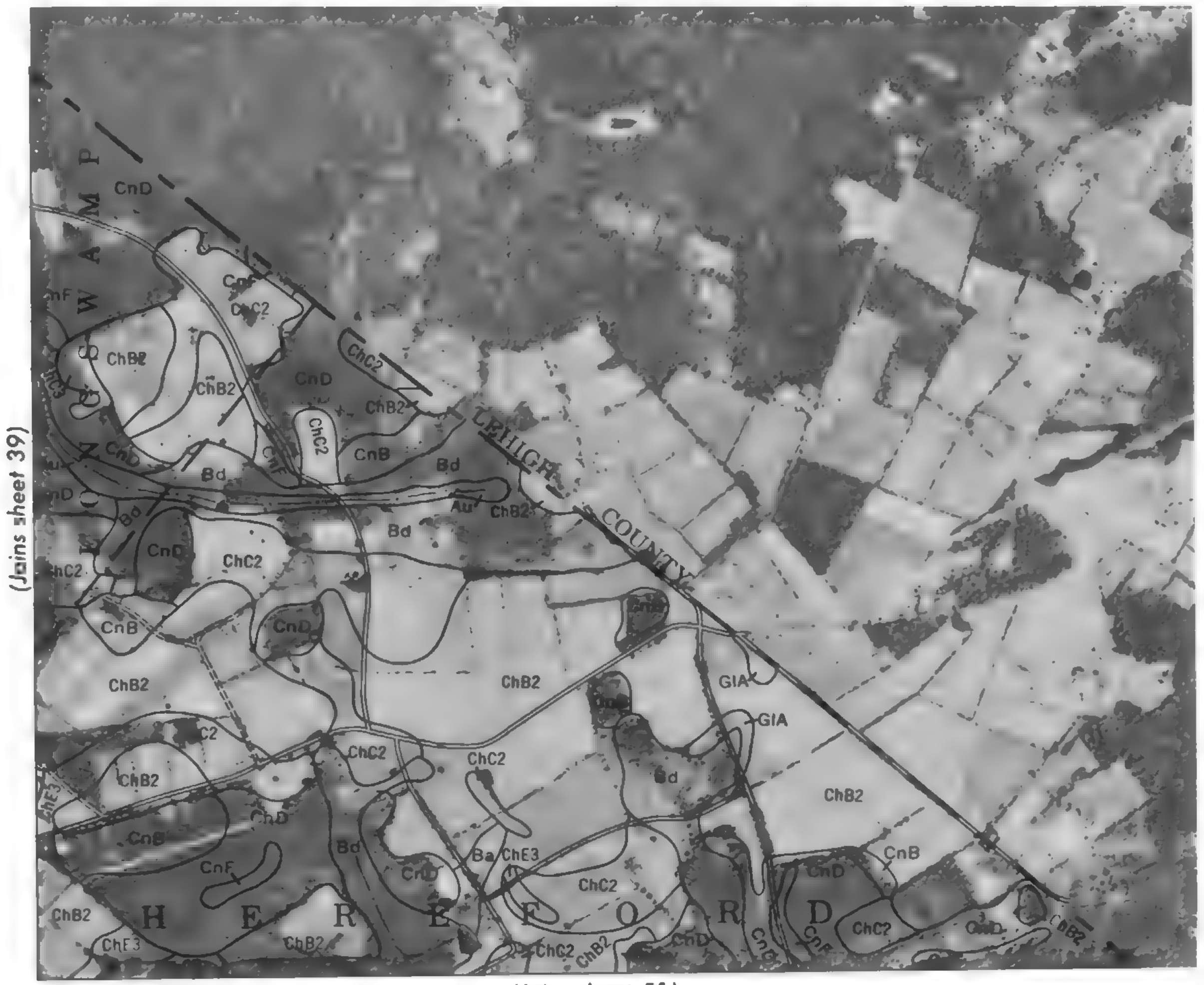


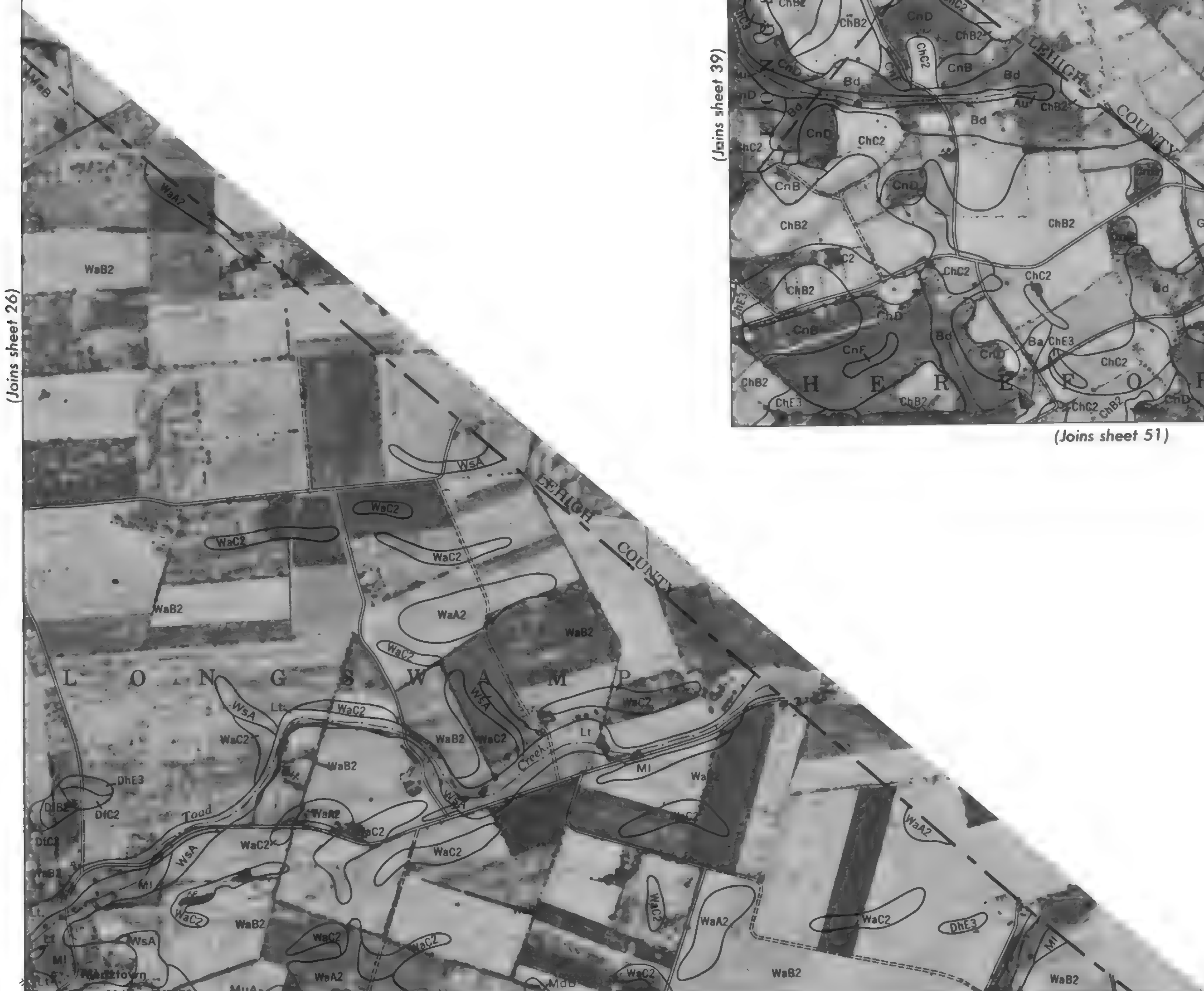
(Joins sheet 26)

(Joins sheet 37)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


26
(Joins sheet 16)
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 38)
N
Maxatawny
Zion Church
Schofer
Monterey
GRAVEL PIT
IRON ORE PIT
LEHIGH COUNTY
M A X A T A W N Y
Farmington
Klines Corner
Five Points
Oreville
Ringtown
Hinterleiter
READING
L O N G S W A M P
Toad Creek
Mertztown
0
½
1 Mile
Scale 1:15 840
0
5000 Feet





N

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

28

N

(Joins inset, sheet 17)

(Joins sheet 29)

LaC2

BuA

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins inset, sheet 52)

BERKS COUNTY, PENNSYLVANIA NO. 28

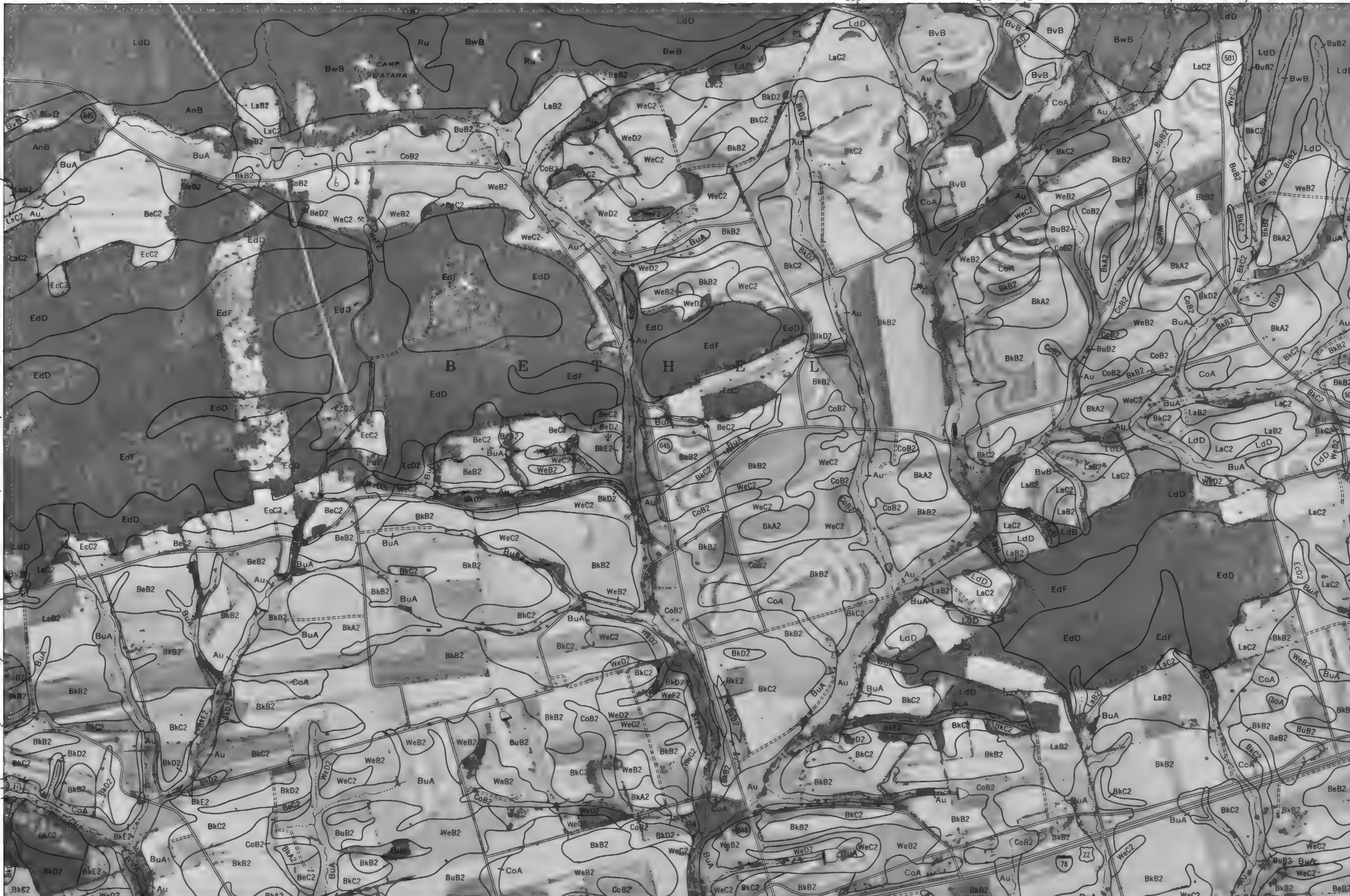
This map is one of a set compiled in 1967 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, the Pennsylvania State University, College of Agriculture and Agricultural Experiment Station, and the Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission.

29

(Joins sheet 17)

(Joins sheet 28)

(Joins sheet 30)



(Joins sheet 40)

0 ½ 1 Mile

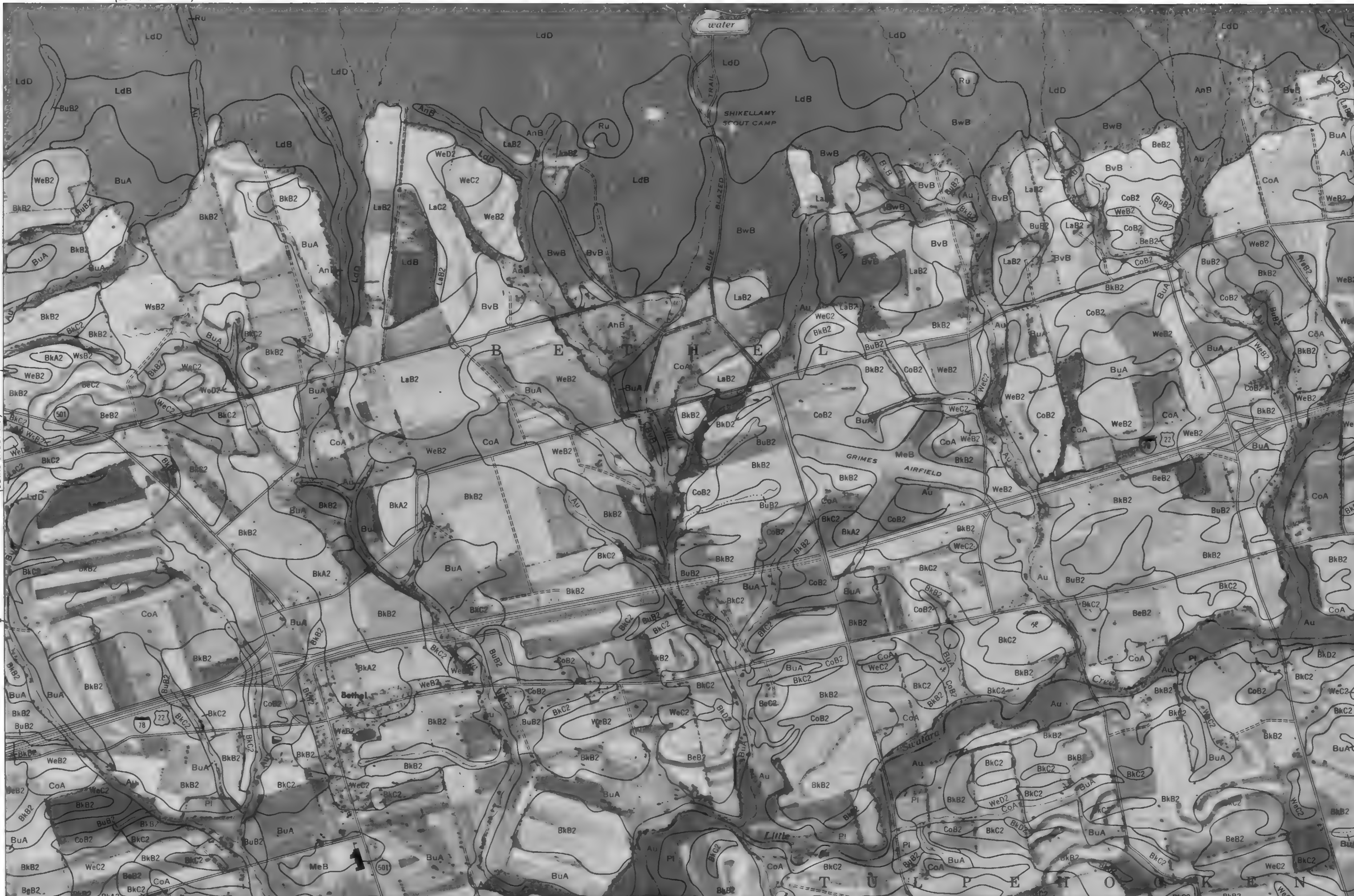
Scale 1:15 840

0 5000 Feet

(30)

(Joins sheet 18)

(Joins sheet 29)

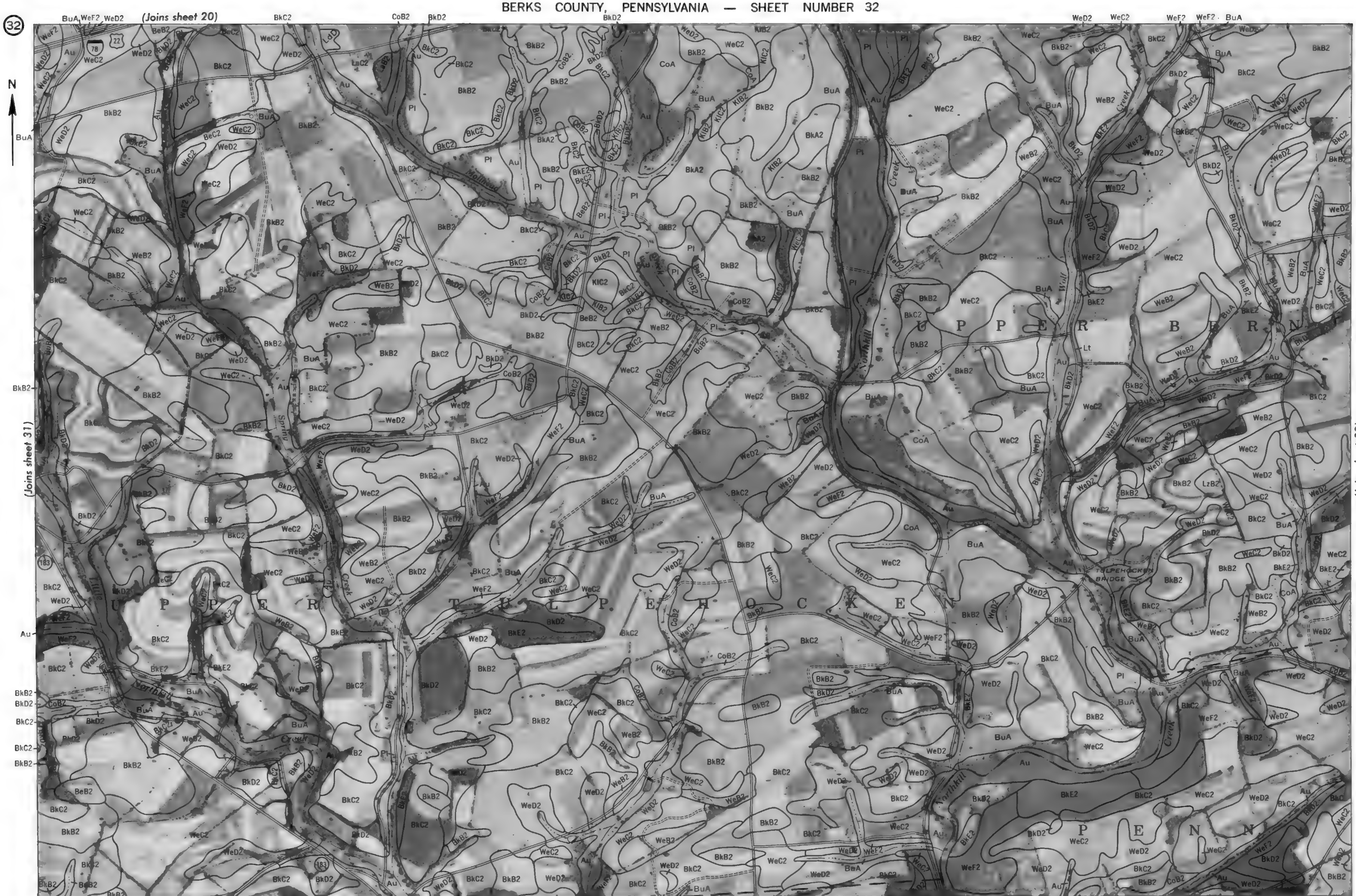


(Joins sheet 31)

(Joins sheet 41)

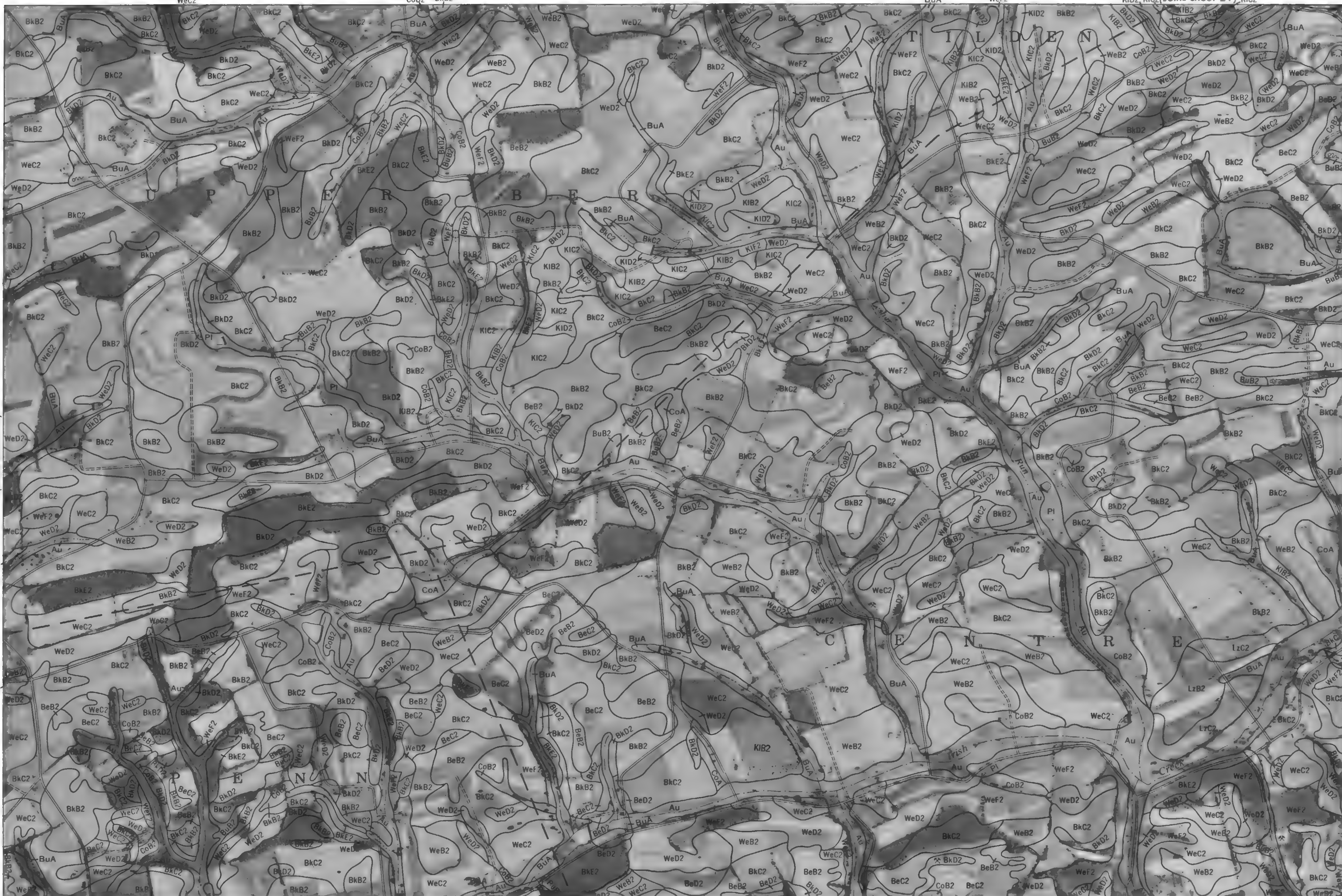
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


31
(Joins sheet 19)
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 42)
N
B E T H E L
U P P E R
T U L P E H O C K E N
T U L P E H O C K E N
Schubert
Strausstown
Little Swatara Creek
Stone Creek
Little Northkill
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

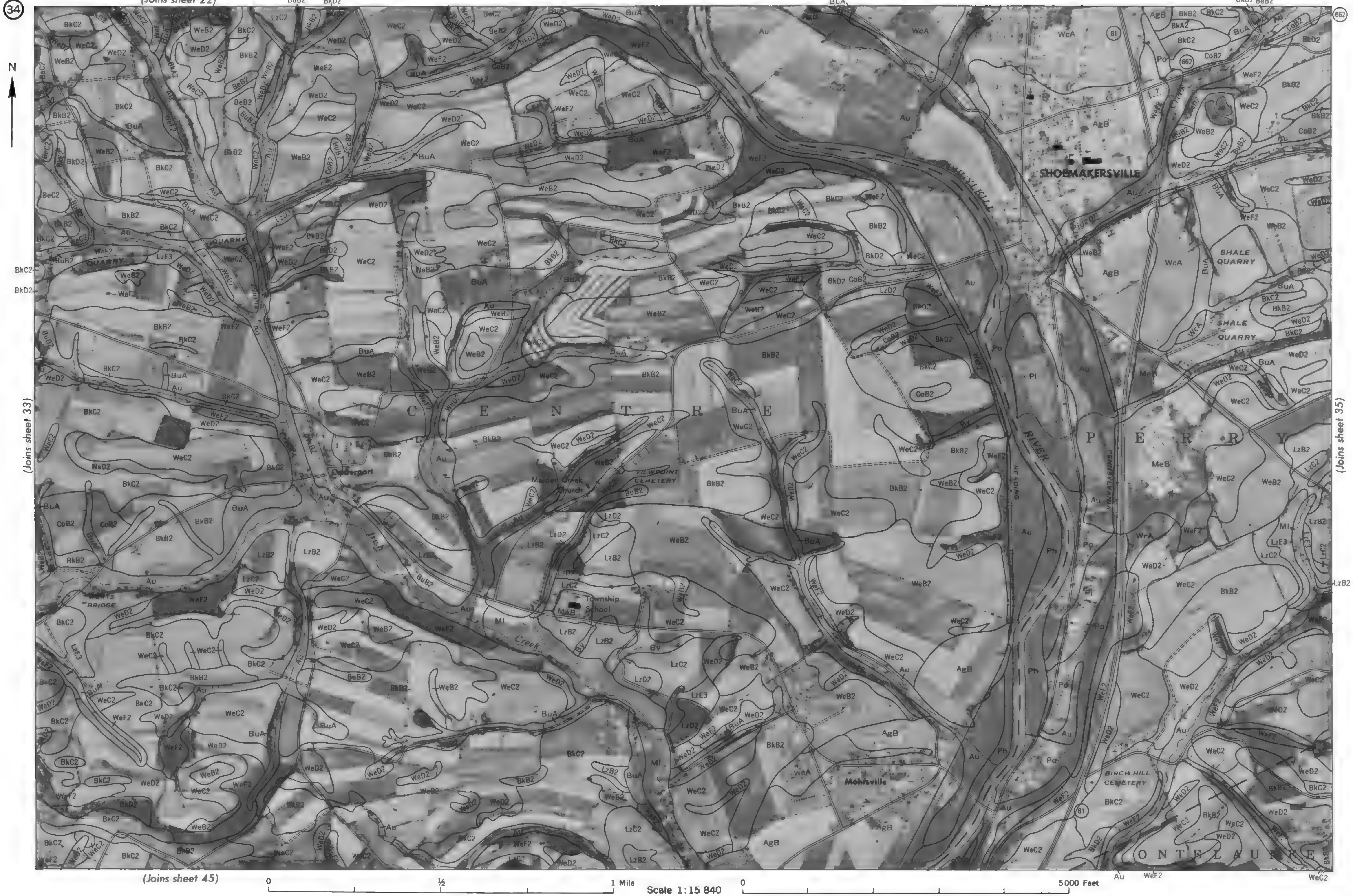


0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

33



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


34
(Joins sheet 22)
(Joins sheet 33)
(Joins sheet 35)
(Joins sheet 45)
N
SHOEMAKERSVILLE
SCHUYLKILL
RIVER
READING
PENNSYLVANIA
C E N T R E
P E R R Y
O N T E L A U N E E
SHALE QUARRY
QUARRY
Centerport
Maiden Creek Church
VIEWPOINT CEMETERY
Township School
Irish Creek
Mohrsville
BIRCH HILL CEMETERY
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

35

(Joins sheet 23)

N

(Joins sheet 34)

(Joins sheet 36)

(Joins sheet 46)

0 — ½ — 1 Mile

Scale 1:15 840

0 — 5000 Feet

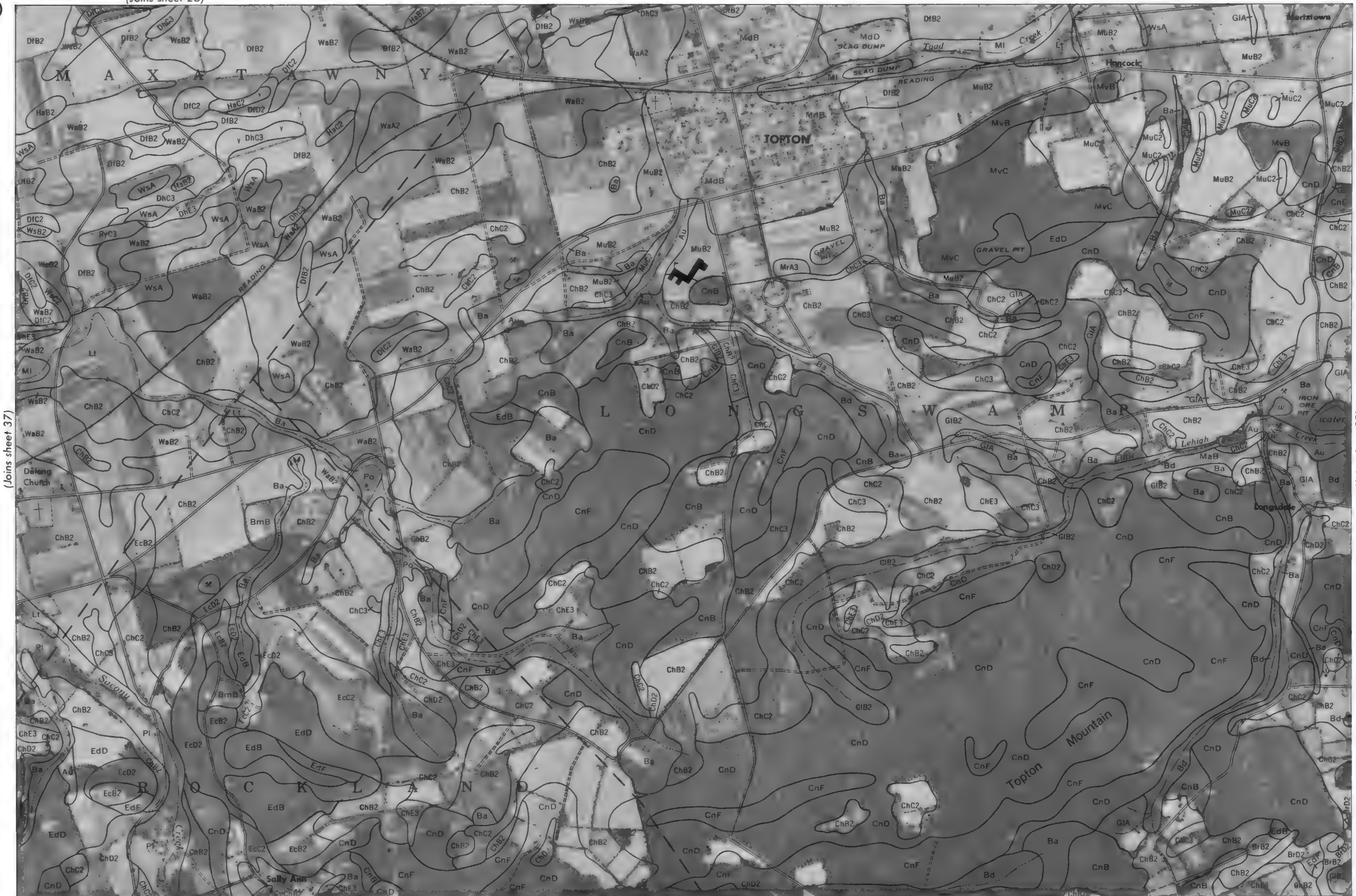

36
(Joins sheet 24)
N
Moselem Creek
St Peters Church
Beckers St Peters Church
IRON ORE PIT
R I C H M O N D
Moselem Springs
Township School
BERKLEIGH COUNTRY CLUB
Kempville
RICH MAIDEN GOLF COURSE
Molltown
M A I D E N C R E E K
QUARRY
PLEASANT HILL GOLF COURSE
Kirbyville
LIMESTONE QUARRY
(Joins sheet 35)
(Joins sheet 37)
(Joins sheet 47)
0
½
1 Mile
Scale 1:15 840
0
5000 Feet


(Joins sheet 25)
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 48)
37
N
KUTZTOWN AIRPORT
Old Order Church
M A X A T A W N Y
R I C H M O N D
GRAVEL PIT
Sacony Creek
Boyers
Lyons
READING
ROCKLAND
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

38

(Joins sheet 26)

N

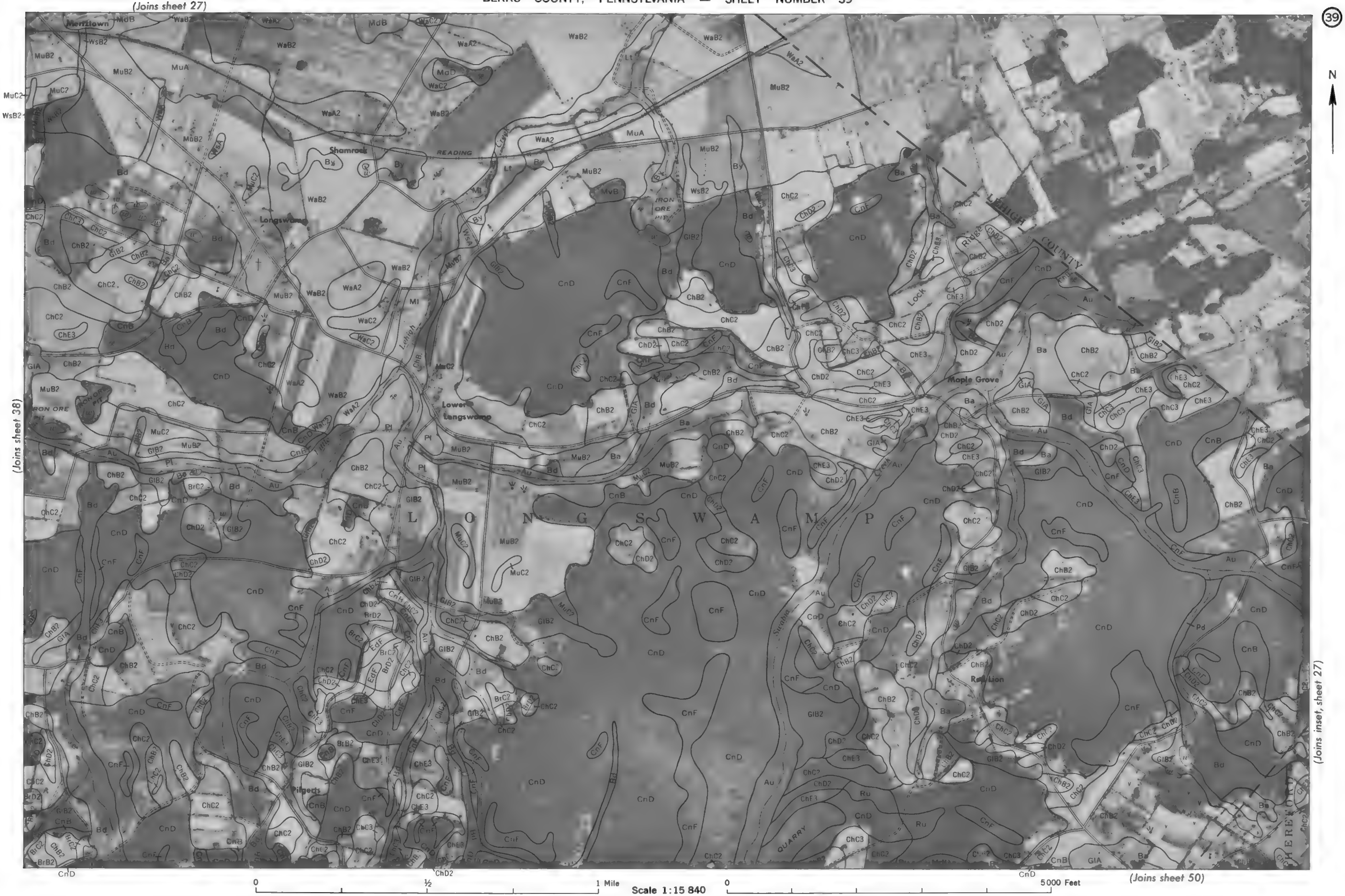


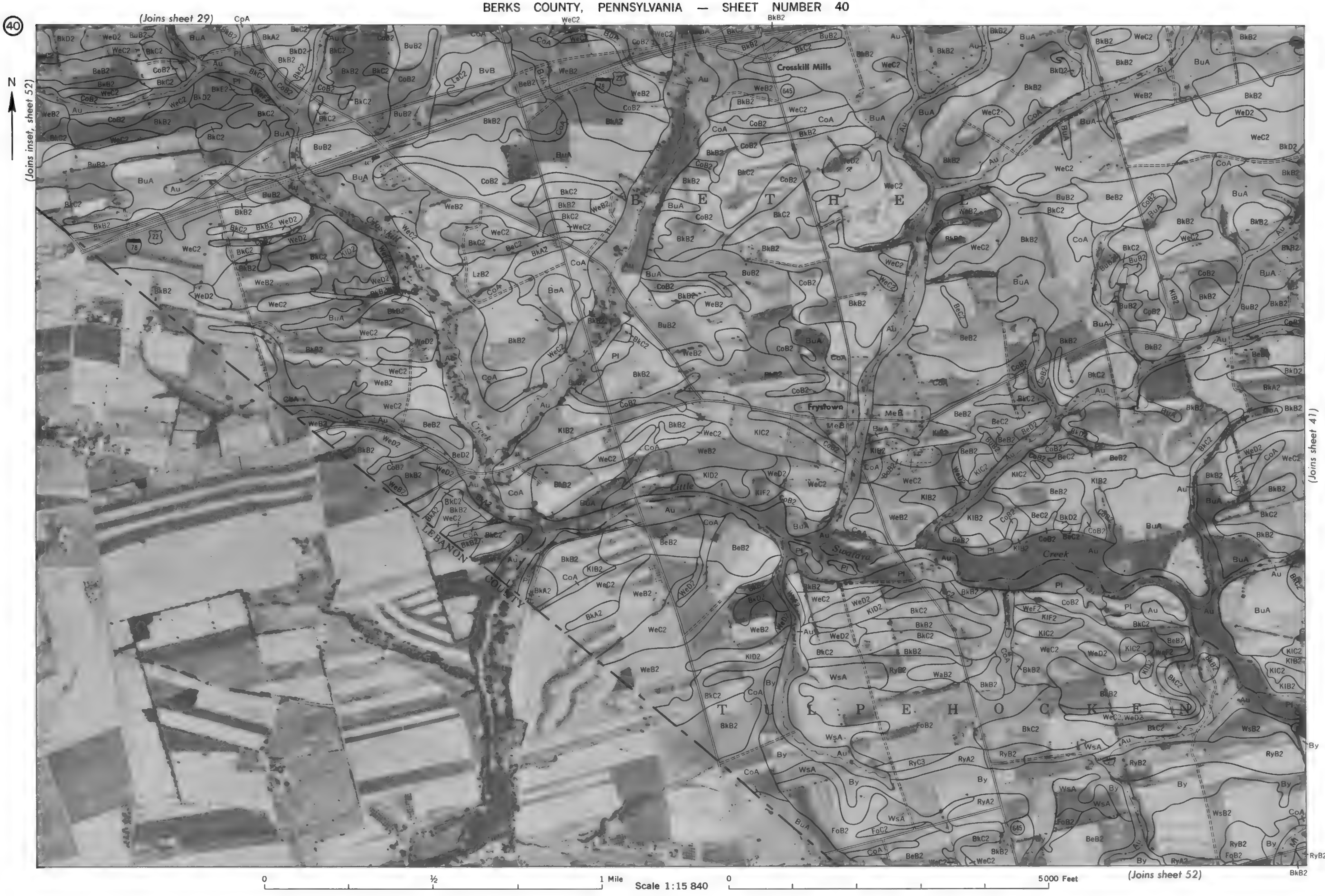
(Joins sheet 37)

(Joins sheet 39)

(Joins sheet 49)

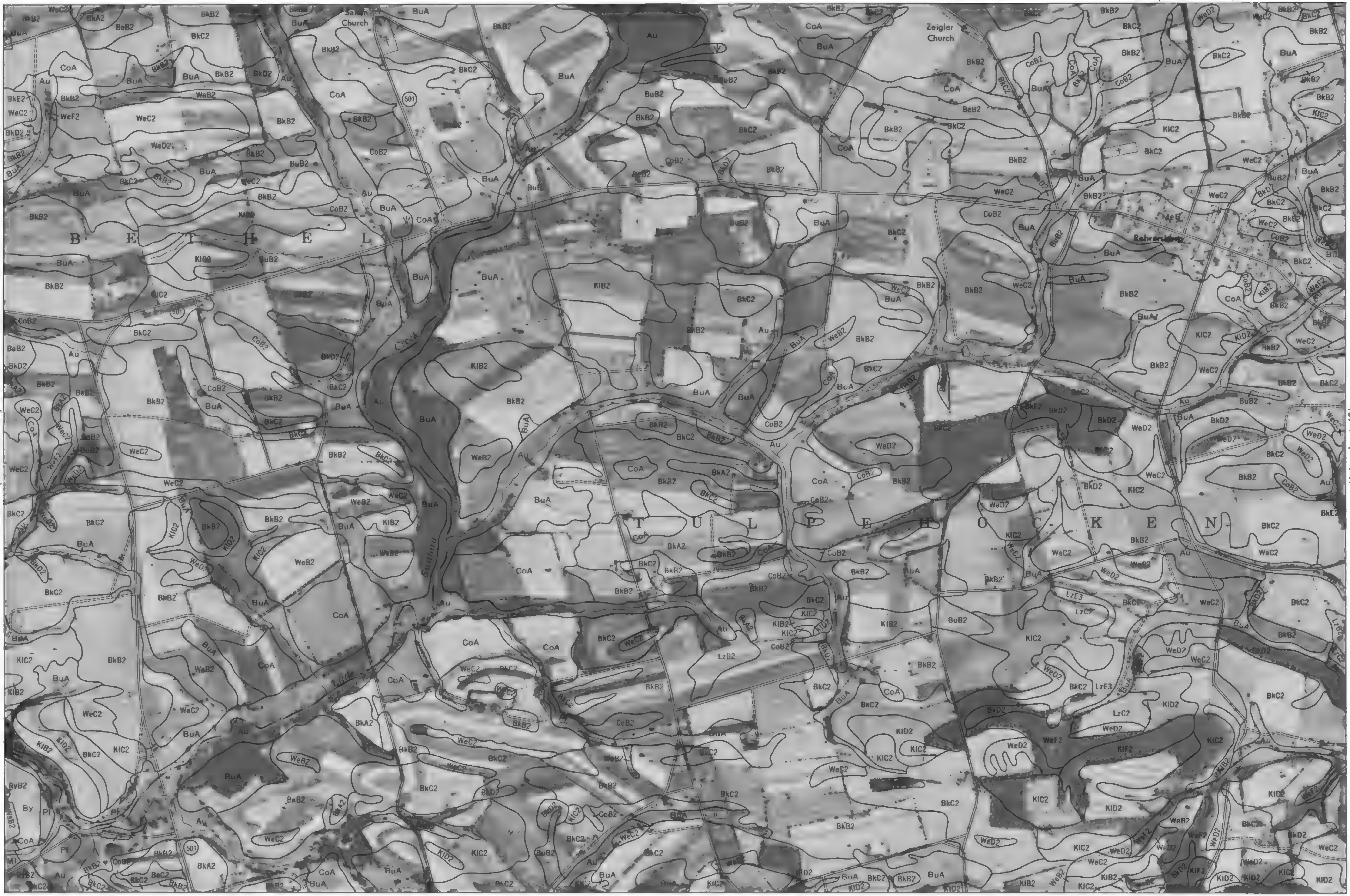
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


(Joins sheet 27)
39
N
Mertztown
Shamrock
Longswamp
Lower Longswamp
L O N G S W A M P
Maple Grove
Red Lion
Pilgerts
LEHIGH COUNTY
HEREFORD
READING
Lehigh
Lock
Ridge
Creek
Swabia
QUARRY
IRON ORE PIT
(Joins sheet 38)
(Joins inset, sheet 27)
(Joins sheet 50)
0
½
1 Mile
Scale 1:15 840
0
5000 Feet


40
(Joins sheet 29)
(Joins inset, sheet 52)
(Joins sheet 41)
(Joins sheet 52)
N
Crosskill Mills
Frystown
B E T H E L
T U L P E H O C K E N
LEBANON COUNTY
Little Swatara Creek
Crosskill Creek
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

(Joins sheet 30)

41

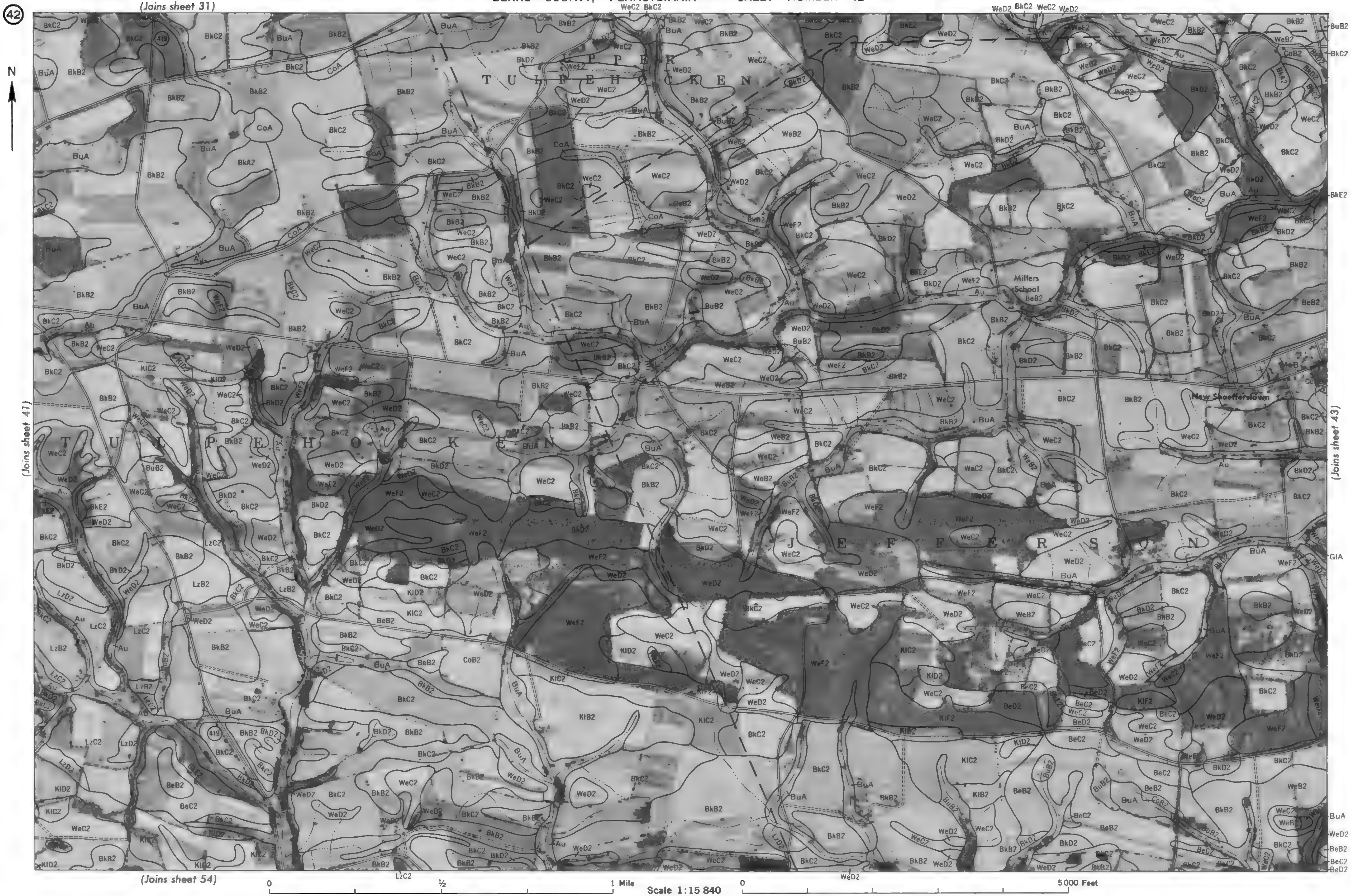


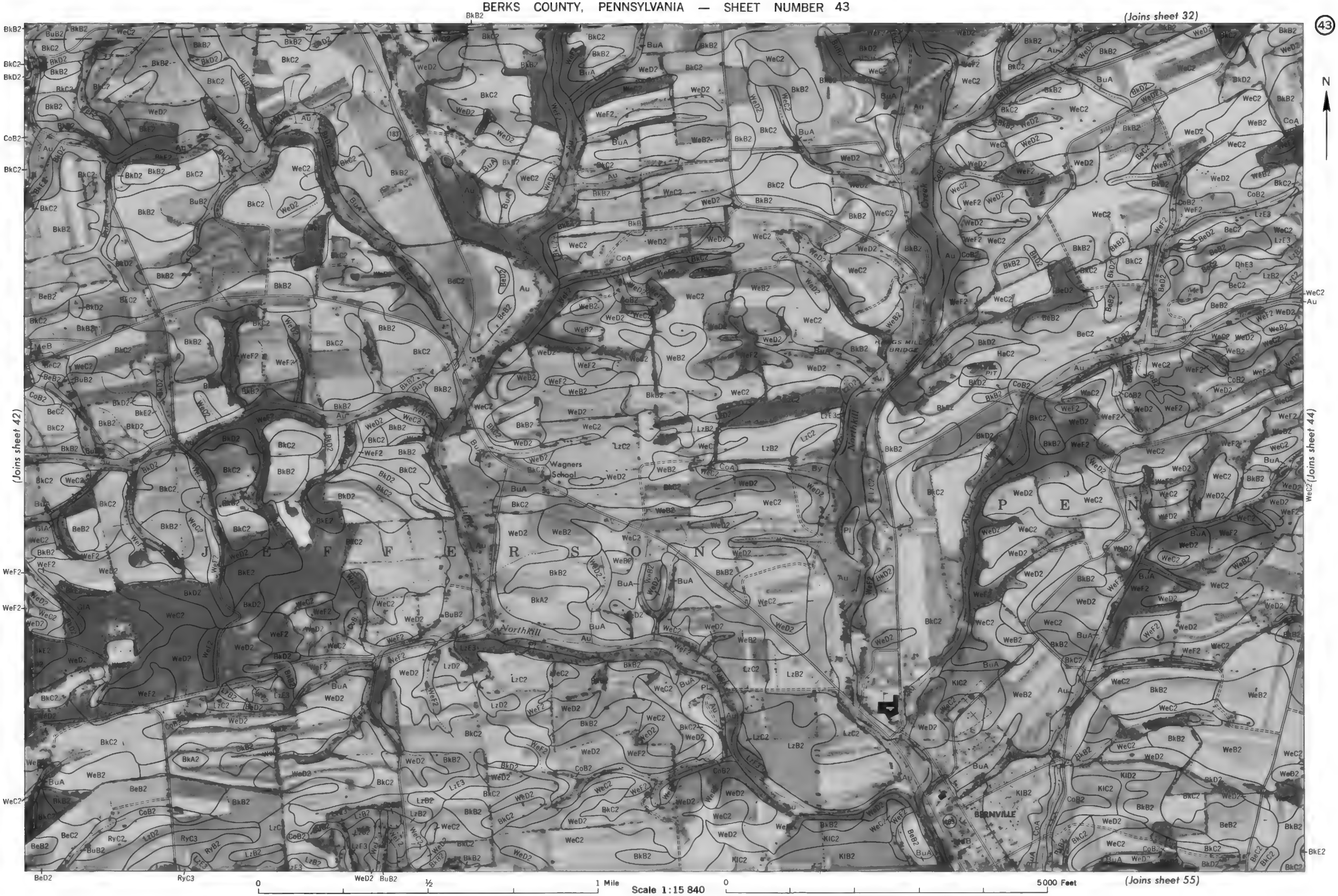
(Joins sheet 40)

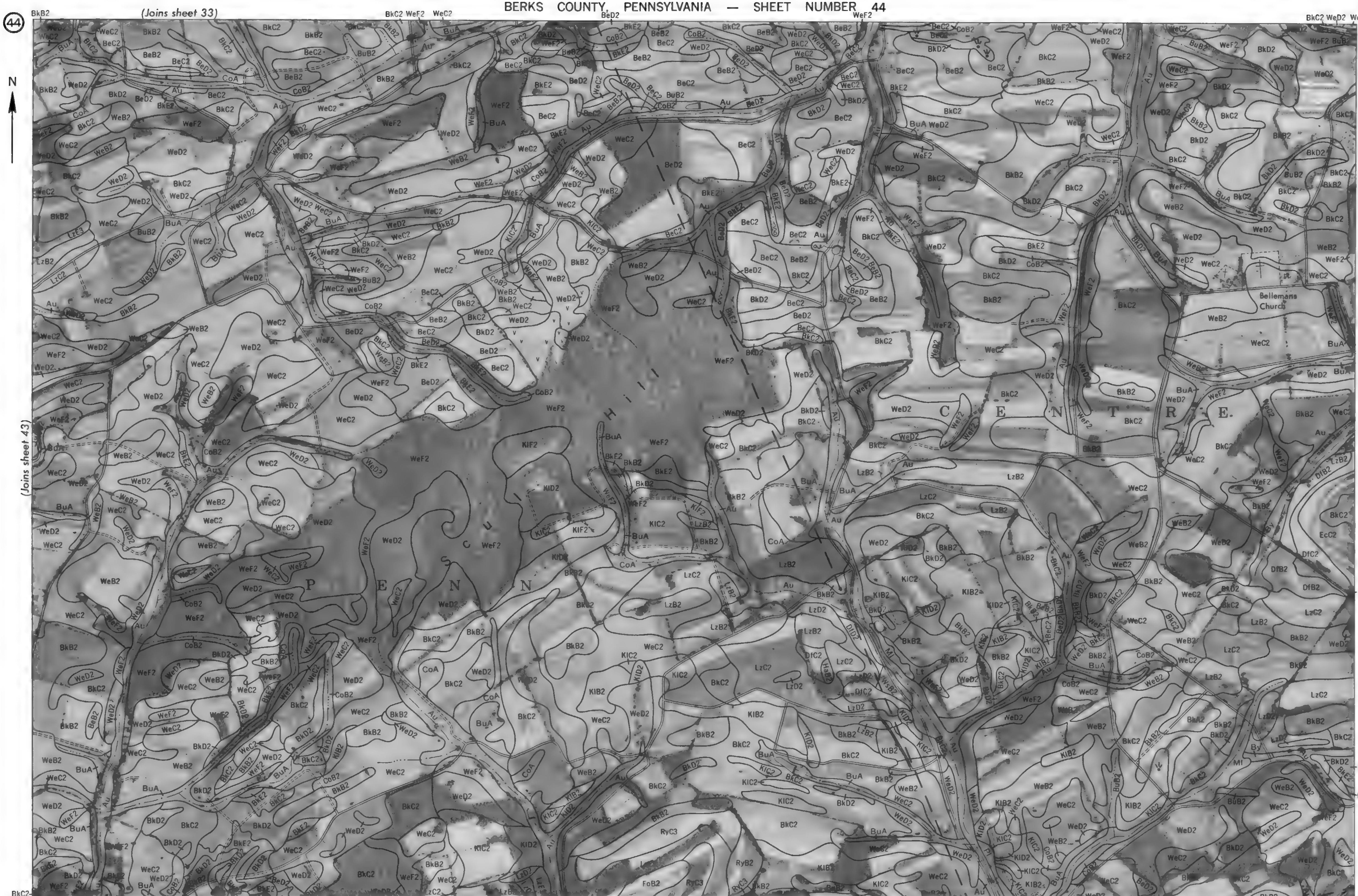
(Joins sheet 42)

(Joins sheet 53)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


42
N
(Joins sheet 31)
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 54)
UPPER
TULPEHOCKEN
TULPEHOCKEN
JEFFERSON
Millers School
New Schaefferstown
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

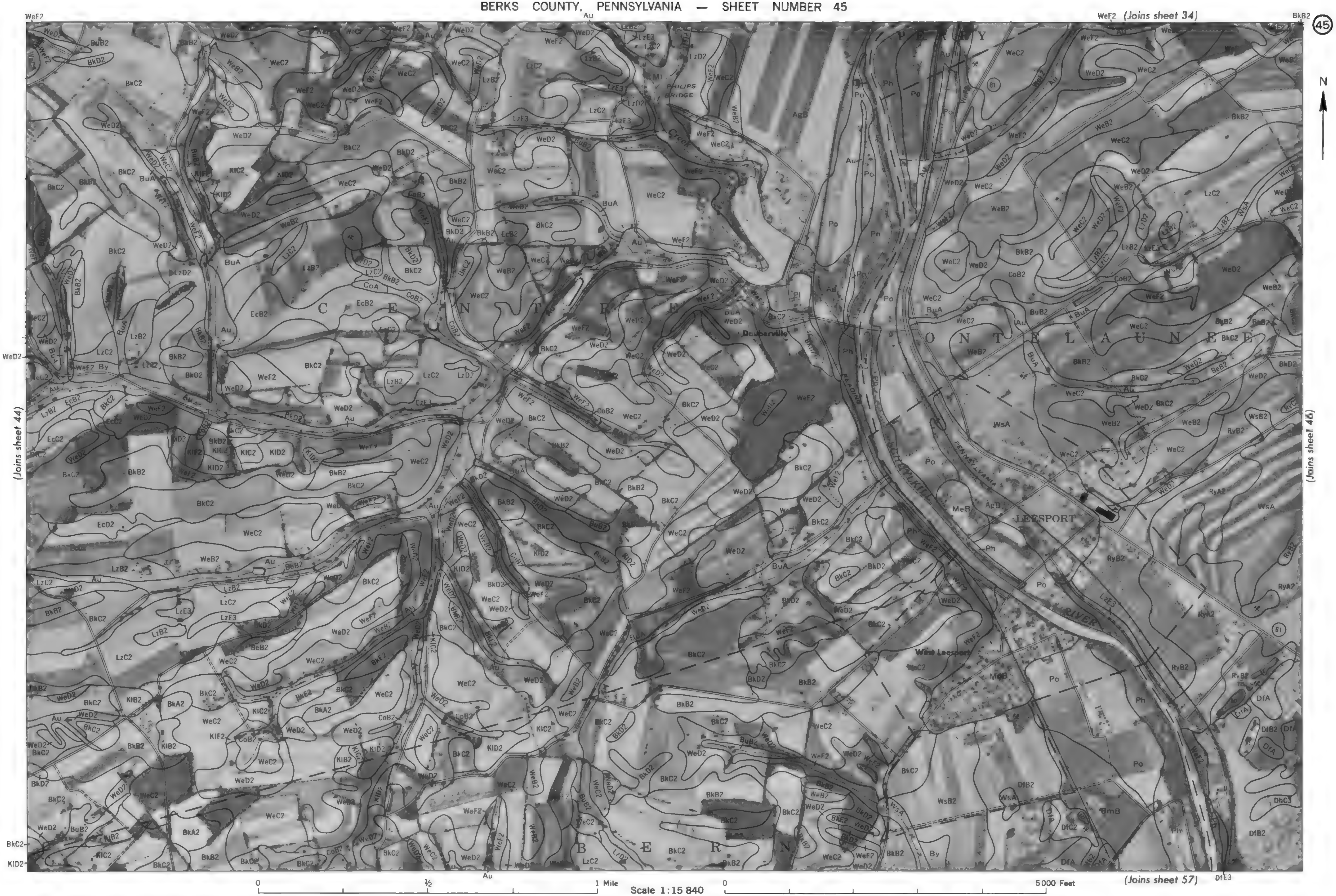

(Joins sheet 32)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 55)
N
J E F F E R S O N
P E N N
Wagners School
Northkill
Northkill Creek
BERNVILLE
PIT
183
Scale 1:15 840
0
½
1 Mile
0
5000 Feet



0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet



(Joins sheet 34)
45
N
(Joins sheet 44)
(Joins sheet 46)
(Joins sheet 57)
PERRY
CENTRE
ONTELAUNEE
BERN
PHILIPS BRIDGE
Dauberville
LEESPORT
West Leesport
SCHUYLKILL RIVER
PENNSYLVANIA
READING
61
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 36)

47

(Joins sheet 46)

(Joins sheet 48)

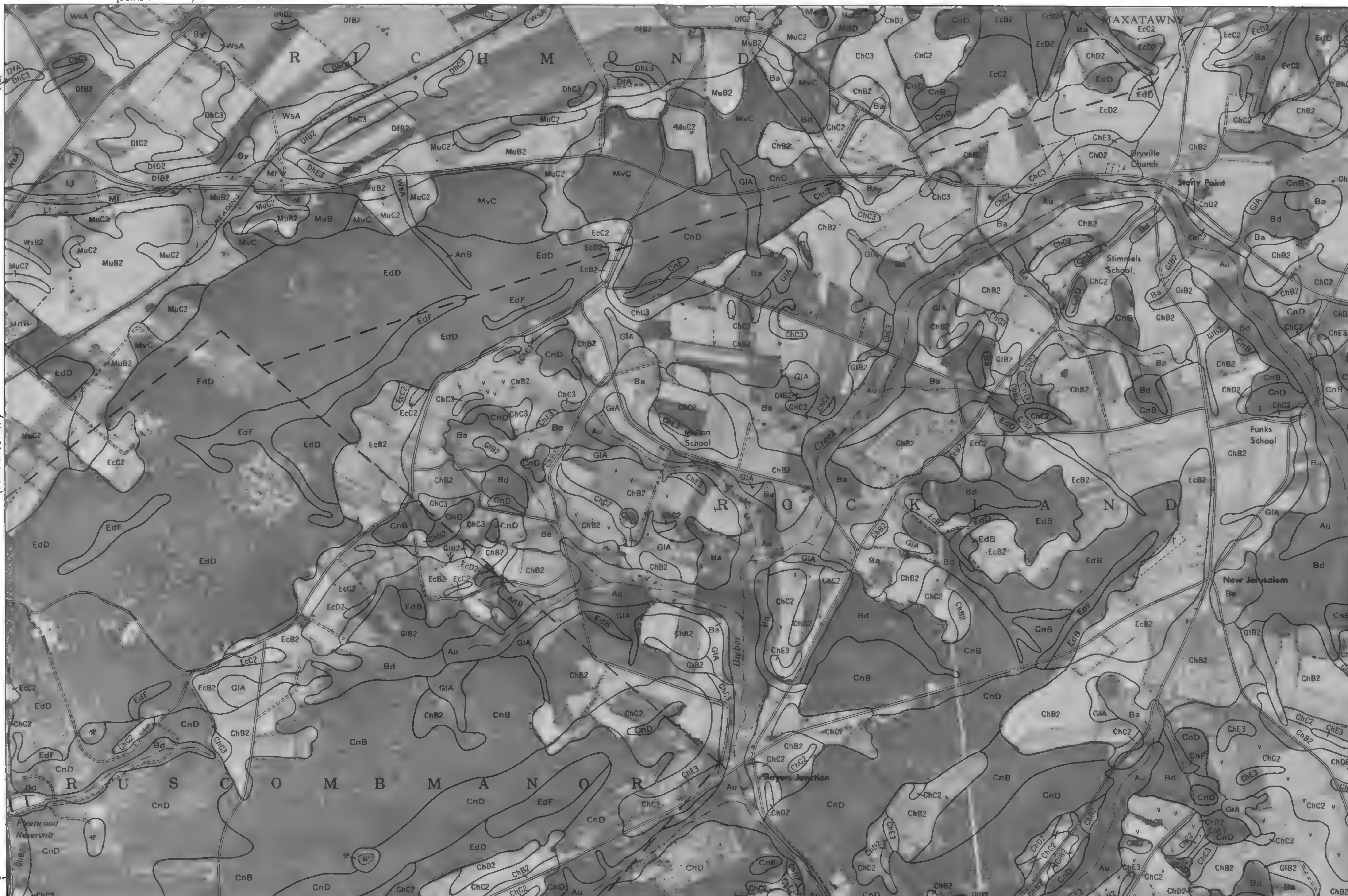
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 59)

48

(Joins sheet 37)

(Joins sheet 47)



(Joins sheet 49)

(Joins sheet 60)

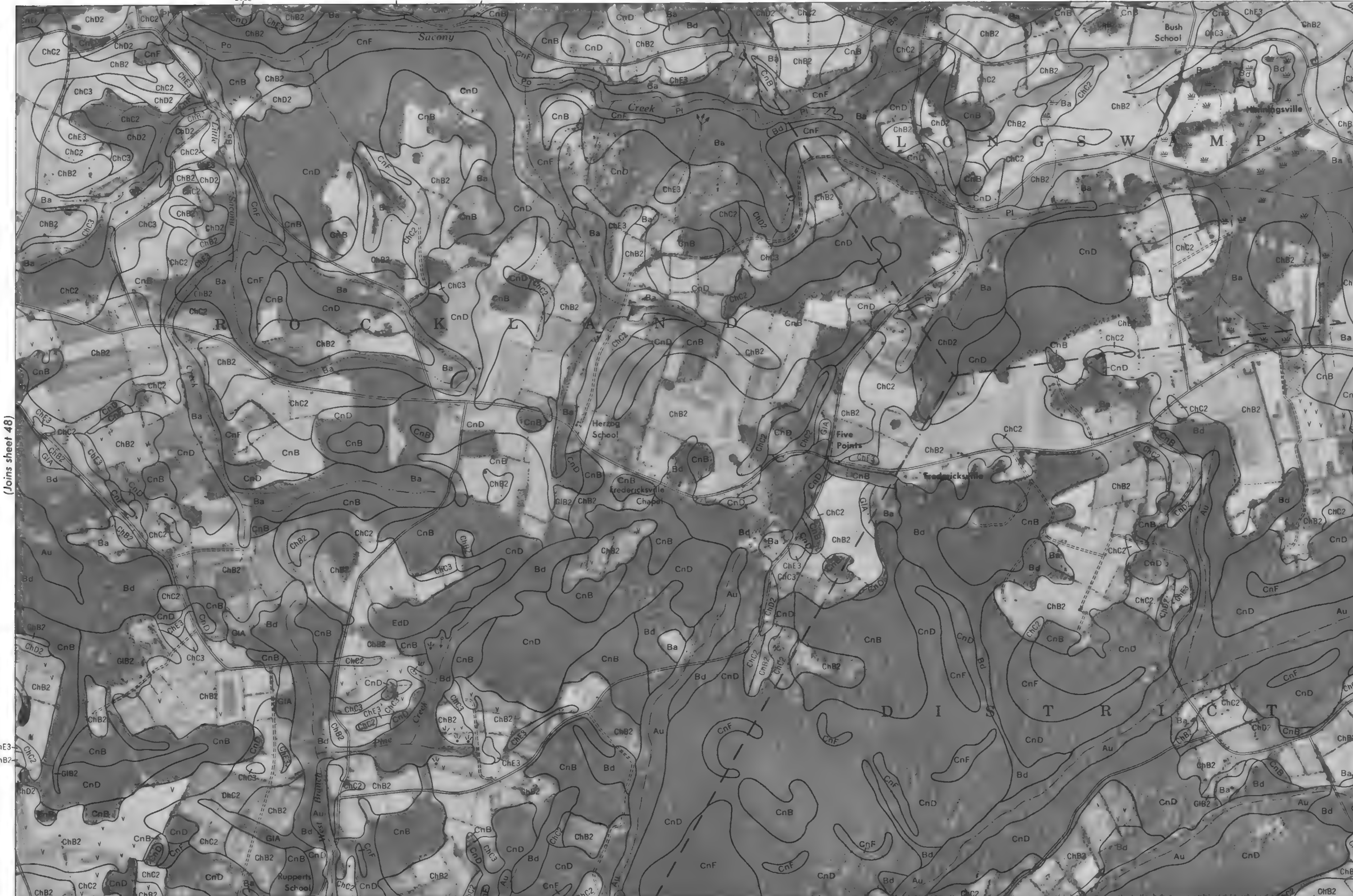
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 49

49

(Joins sheet 38)

(Joins sheet 48)



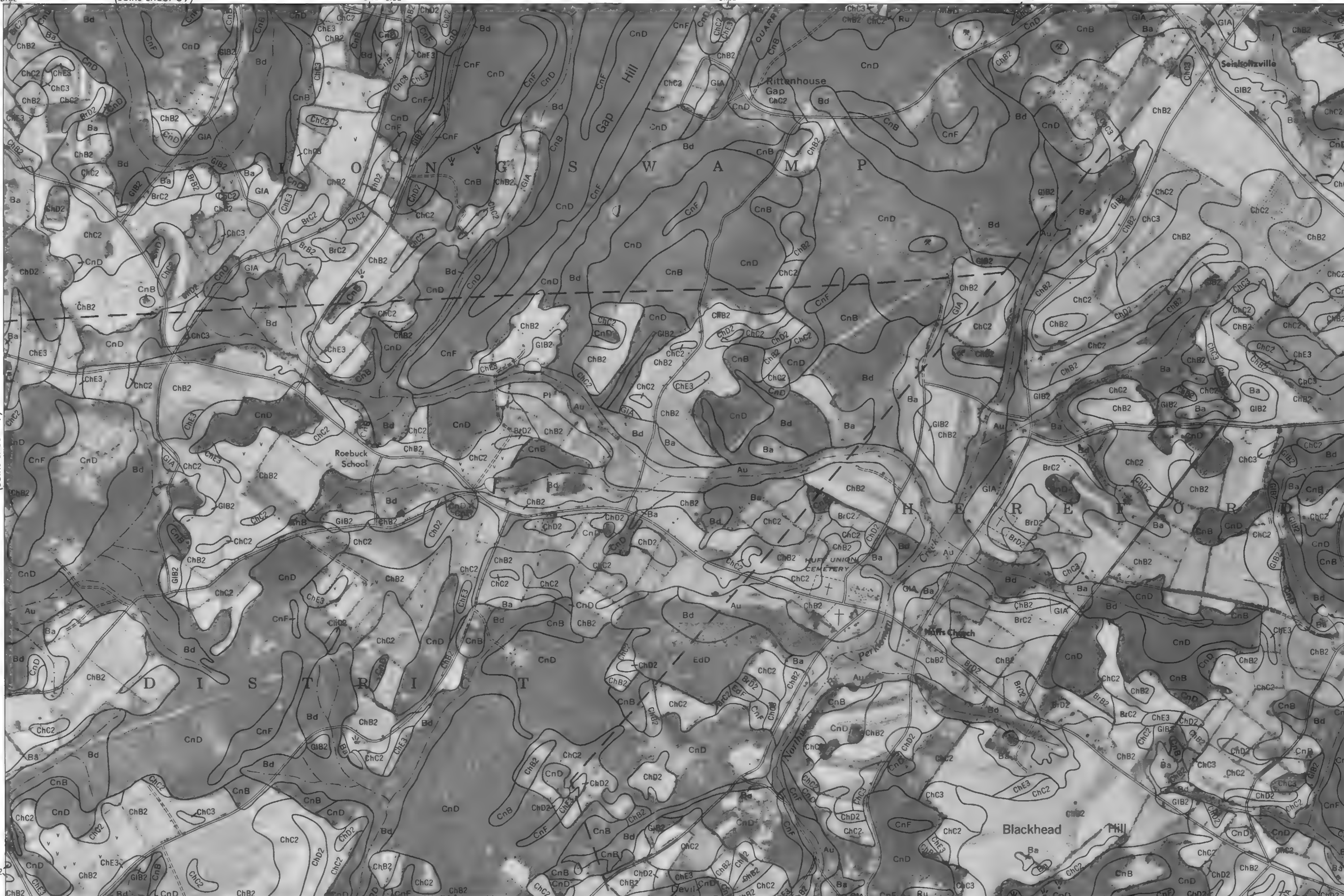
(Joins sheet 50)

(Joins sheet 61)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

50

(Joins sheet 39)



(Joins sheet 49)

(Joins sheet 51)

(Joins sheet 62)

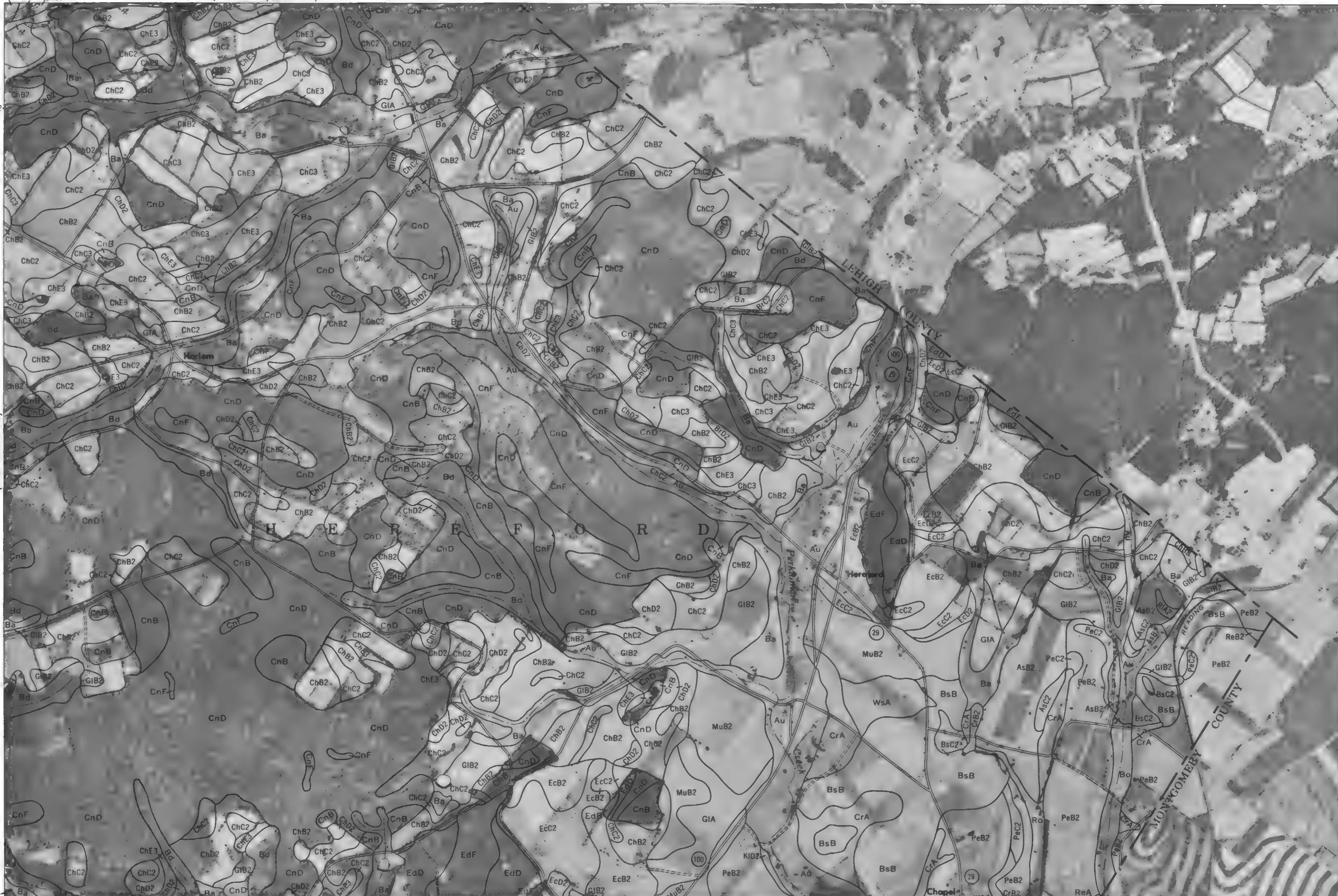
Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

(Joins inset, sheet 27)

(Joins sheet 50)



(Joins sheet 63)

Scale 1:15 840

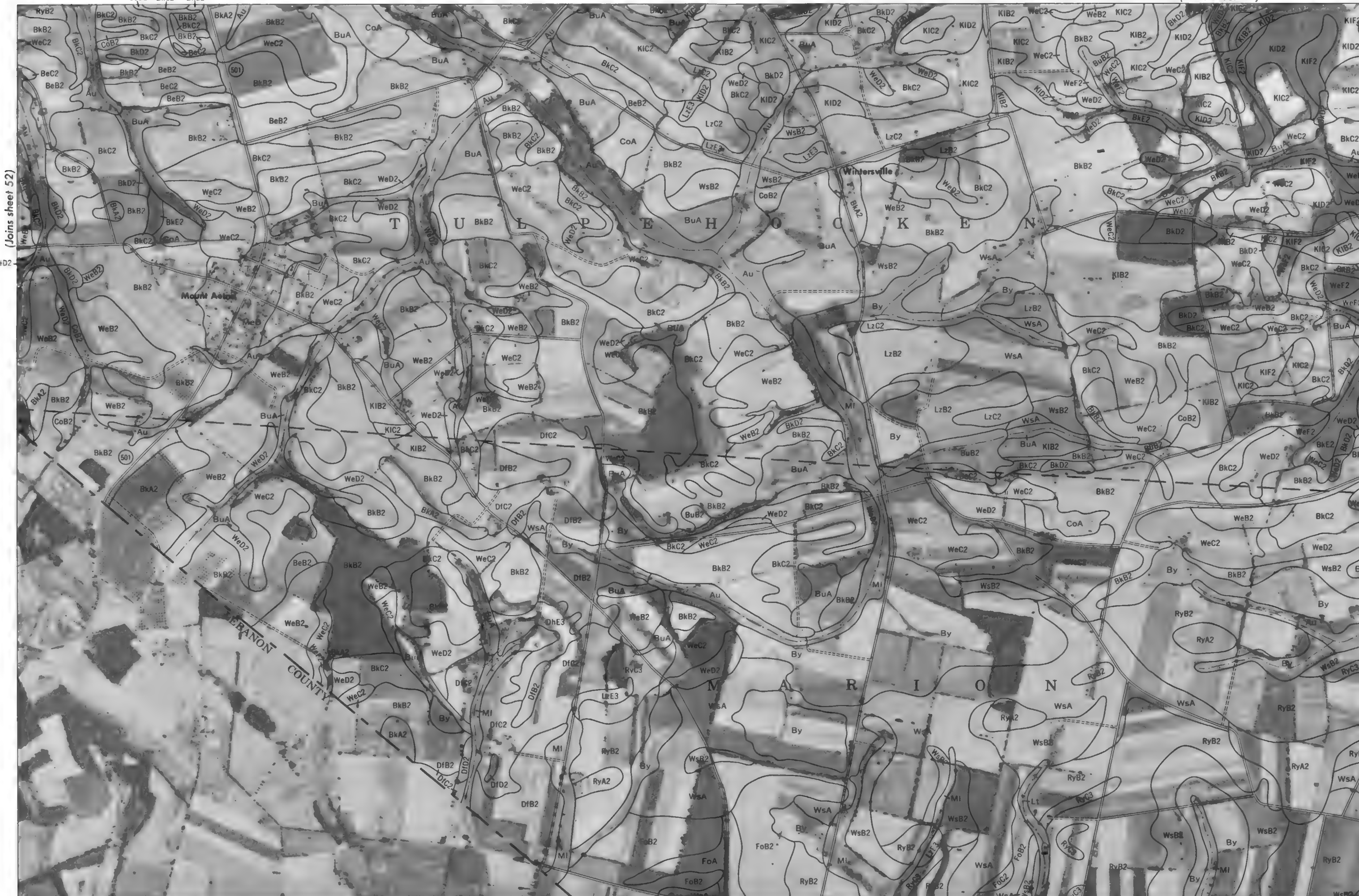
0 ½ 1 Mile

0 5000 Feet

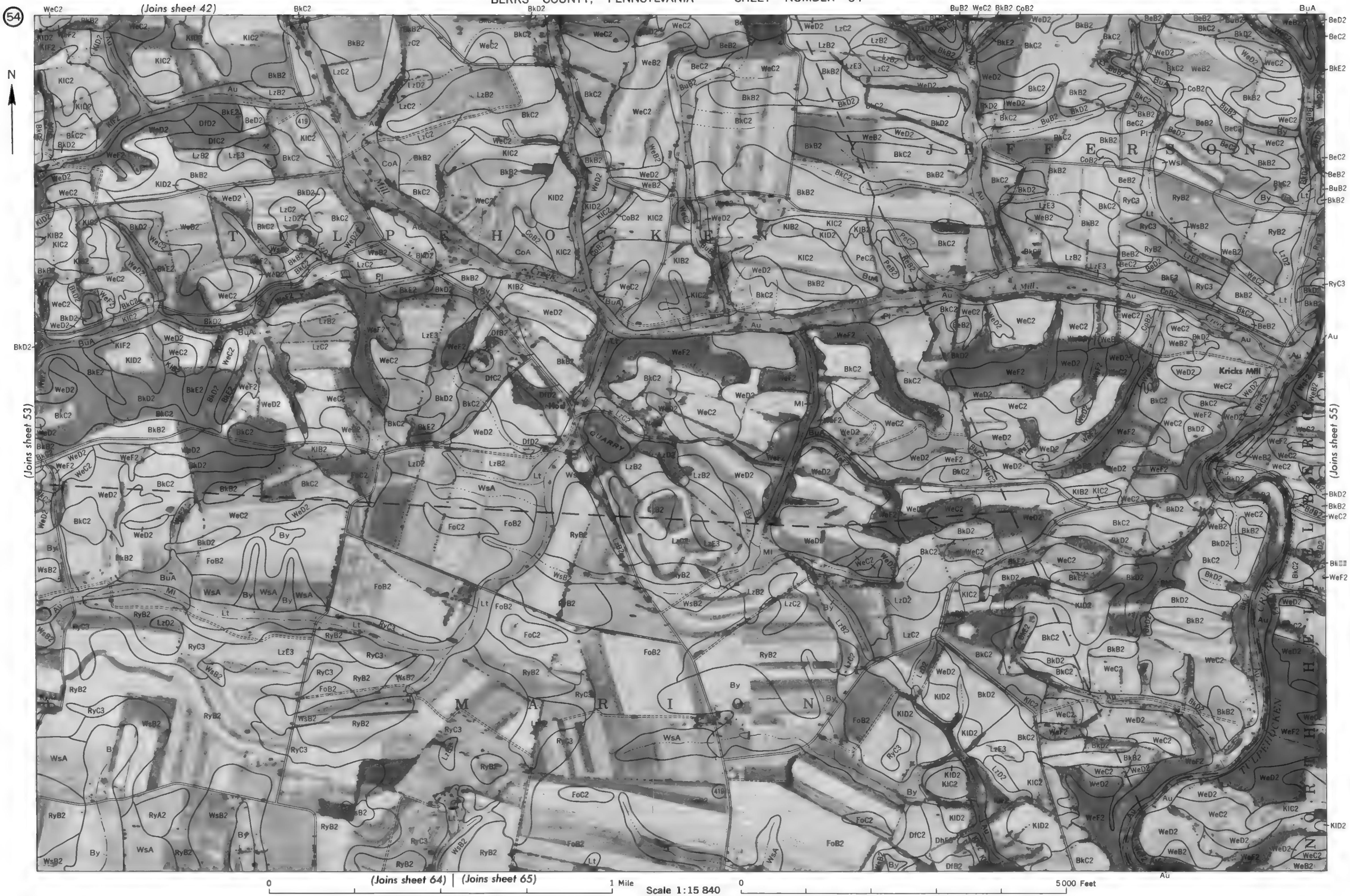
52

N

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

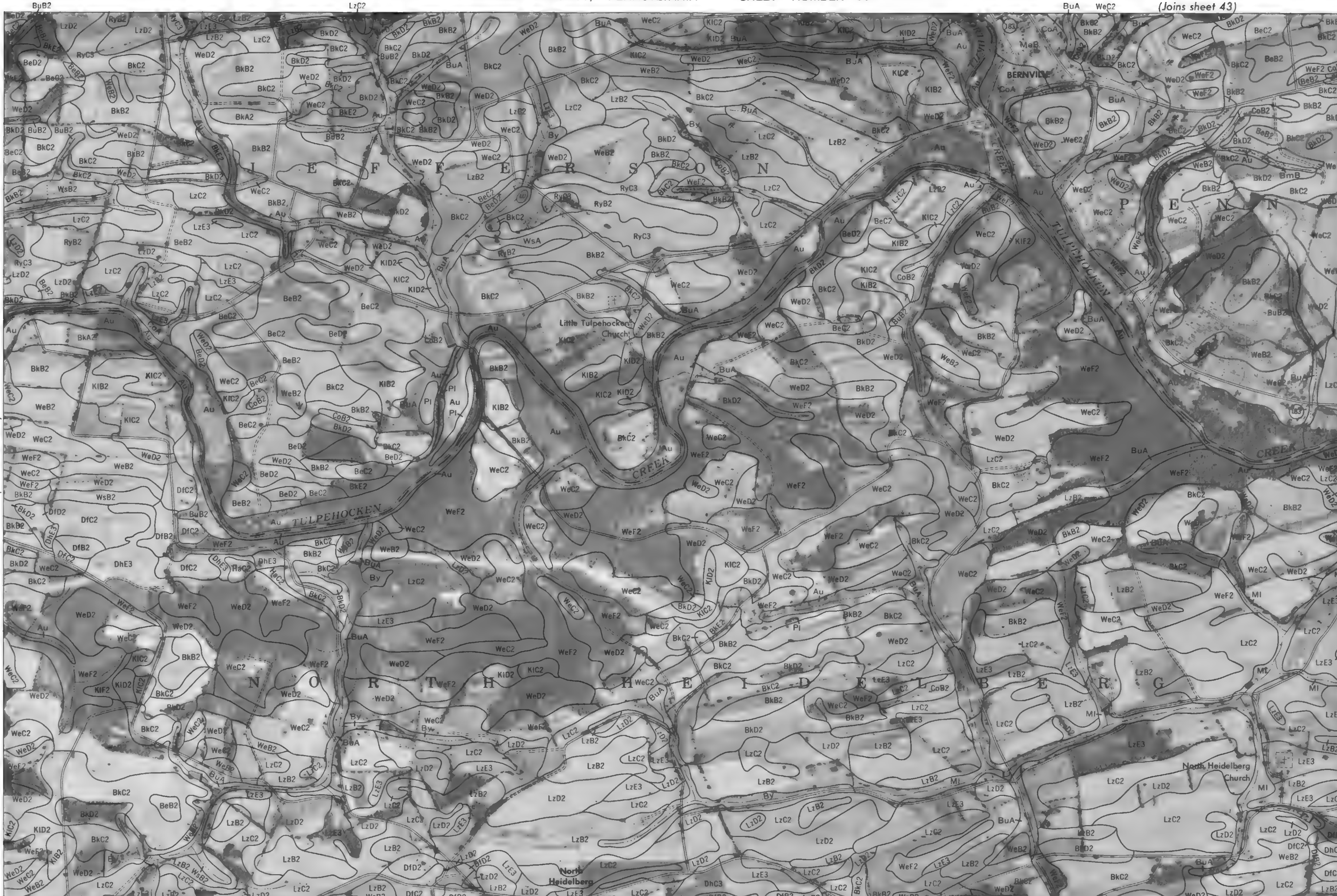


0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


54
(Joins sheet 42)
N
(Joins sheet 53)
(Joins sheet 55)
T U L P E H O C K E N
J E F F E R S O N
M A R I O N
N O R T H H E I D E L B E R G
Mill Creek
Kricks Mill
QUARRY
TULPEHOCKEN CREEK
(Joins sheet 64)
(Joins sheet 65)
0
1 Mile
Scale 1:15 840
0
5000 Feet

(55)

(Joins sheet 43)



(Joins sheet 54)

(Joins sheet 56)

(Joins sheet 65) | (Joins sheet 66)

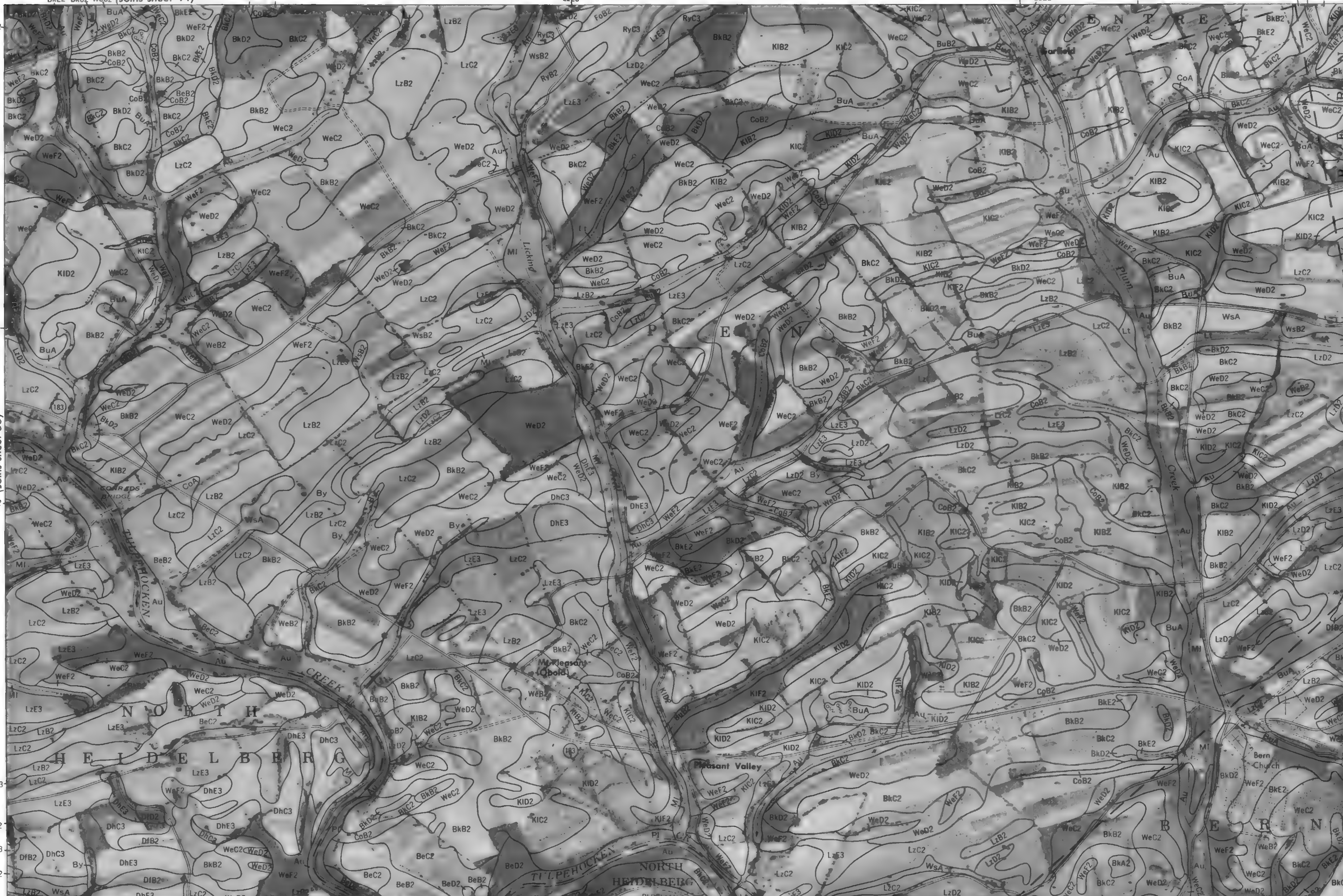
0 — 1 Mile

Scale 1:15 840

0 — 5000 Feet

56

(Joins sheet 44)



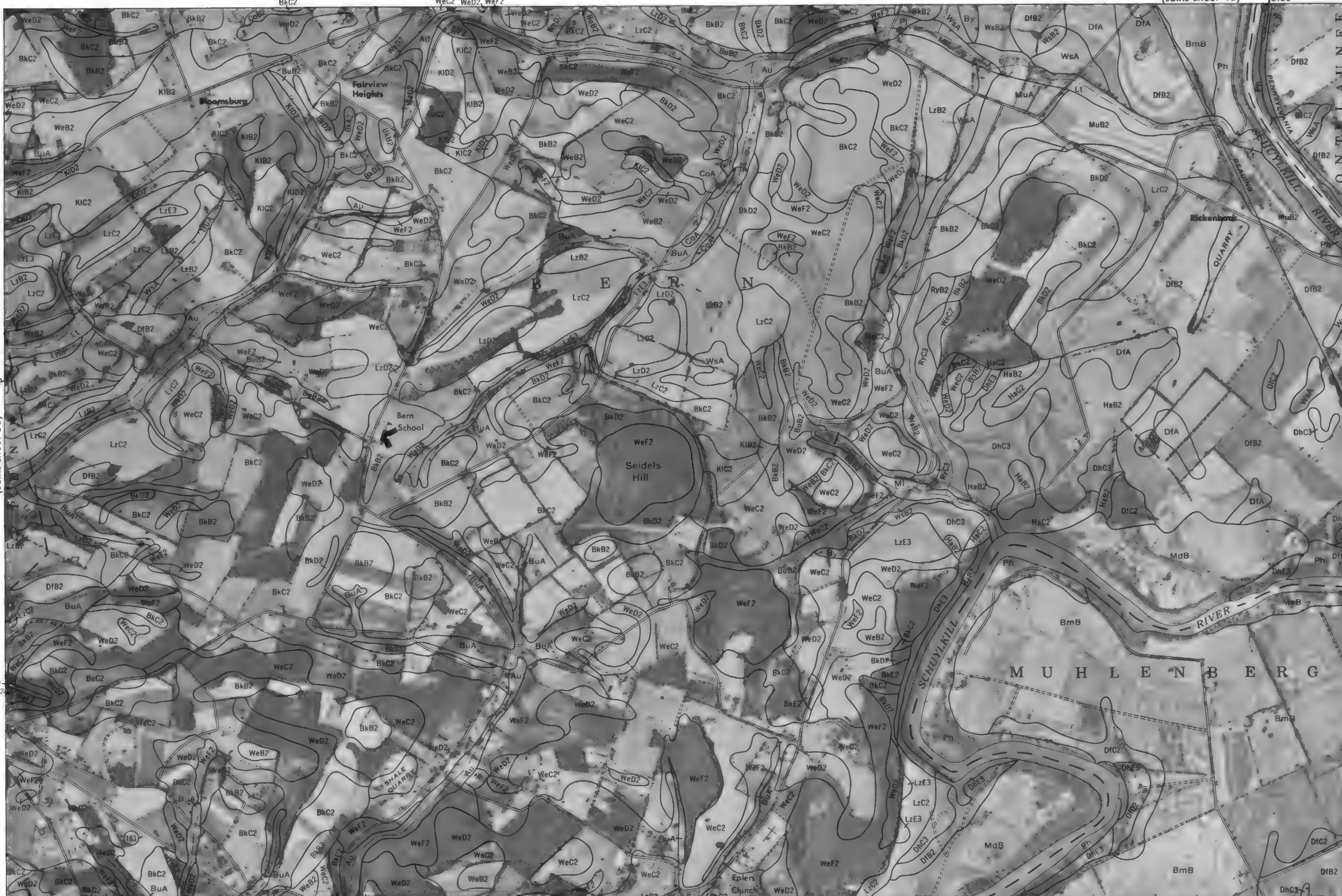
(Joins sheet 55)

(Joins sheet 57)

(Joins sheet 66) | (Joins sheet 67)

0 — 1 Mile   Scale 1:15 840   0 — 5000 Feet

(Joins sheet 45)



(Joins sheet 67) | (Joins sheet 68)

0 — 1 Mile Scale 1:15 840 0 — 5000 Feet

(Joins sheet 46)

N

(Joins sheet 57)

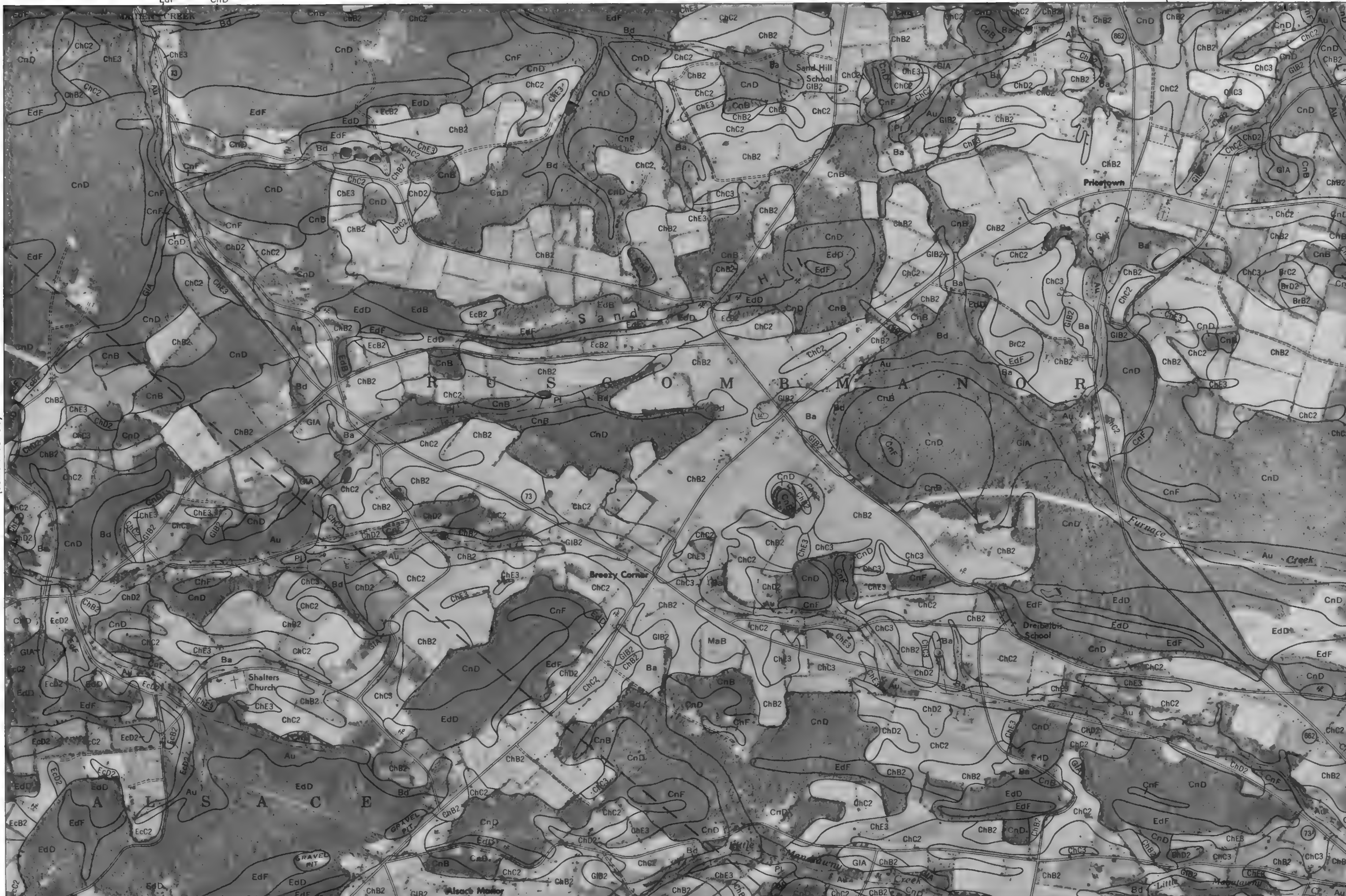
(Joins sheet 59)

(Joins sheet 68) | (Joins sheet 69)

0 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 47)

59



(Joins sheet 69) | (Joins sheet 70)

0 — 1 Mile Scale 1:15 840 0 — 5000 Feet

(Joins sheet 48)

(Joins sheet 59)

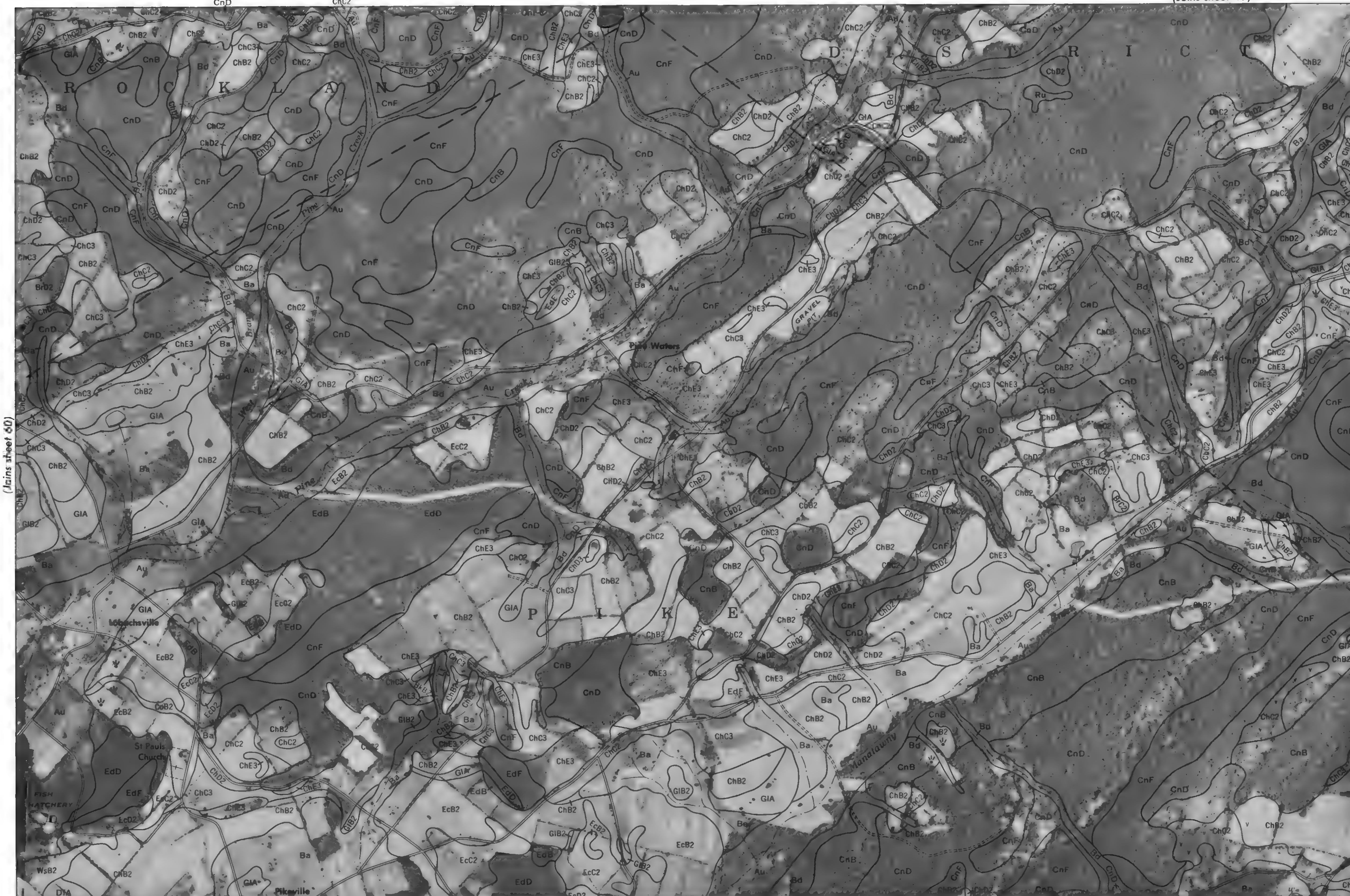
(Joins sheet 61)

(Joins sheet 70) | (Joins sheet 71)

0 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 49)

(Joins sheet 60)

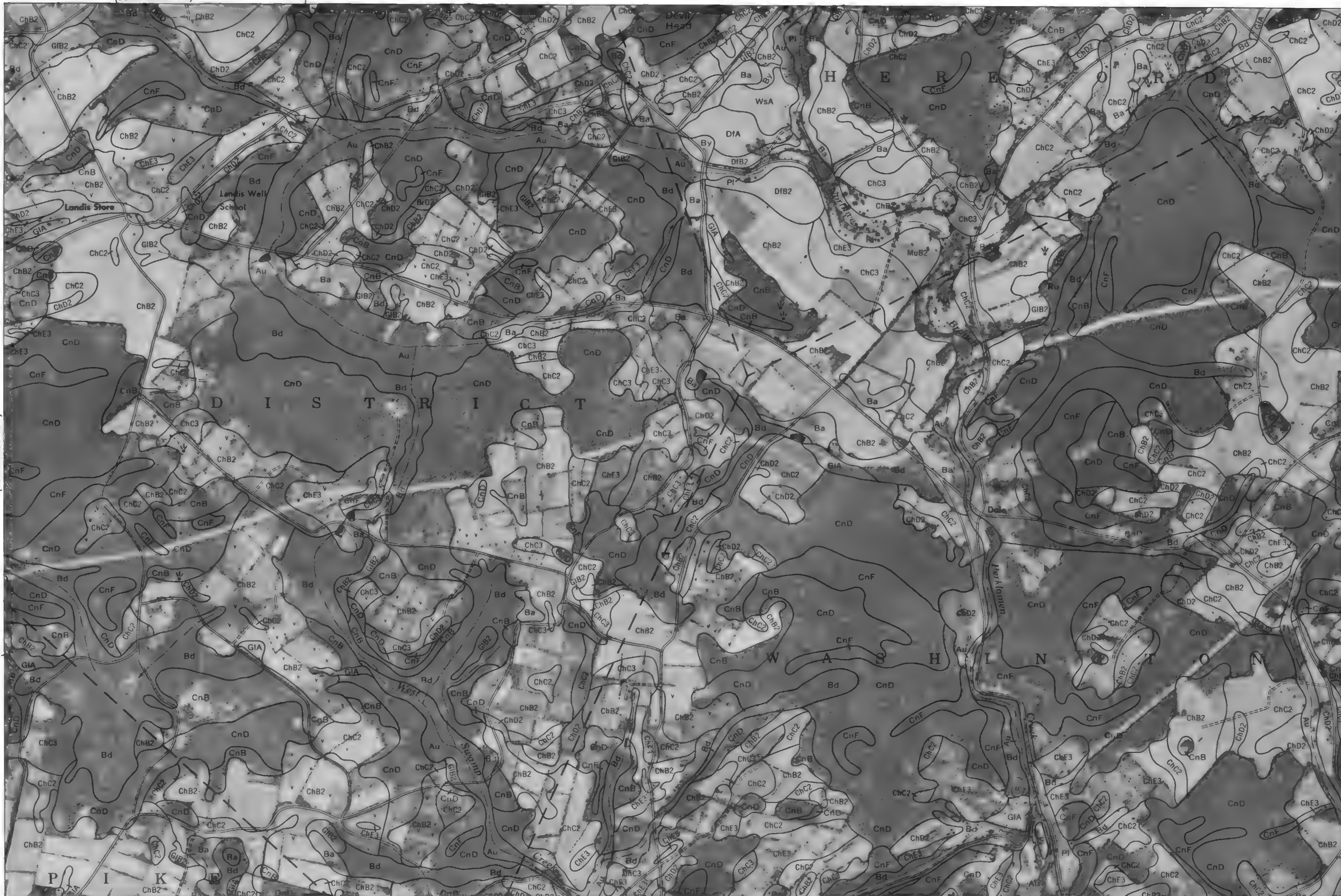


(Joins sheet 62)

(Joins sheet 71) | (Joins sheet 72)

0 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 50)



(Joins sheet 61)

(Joins sheet 63)

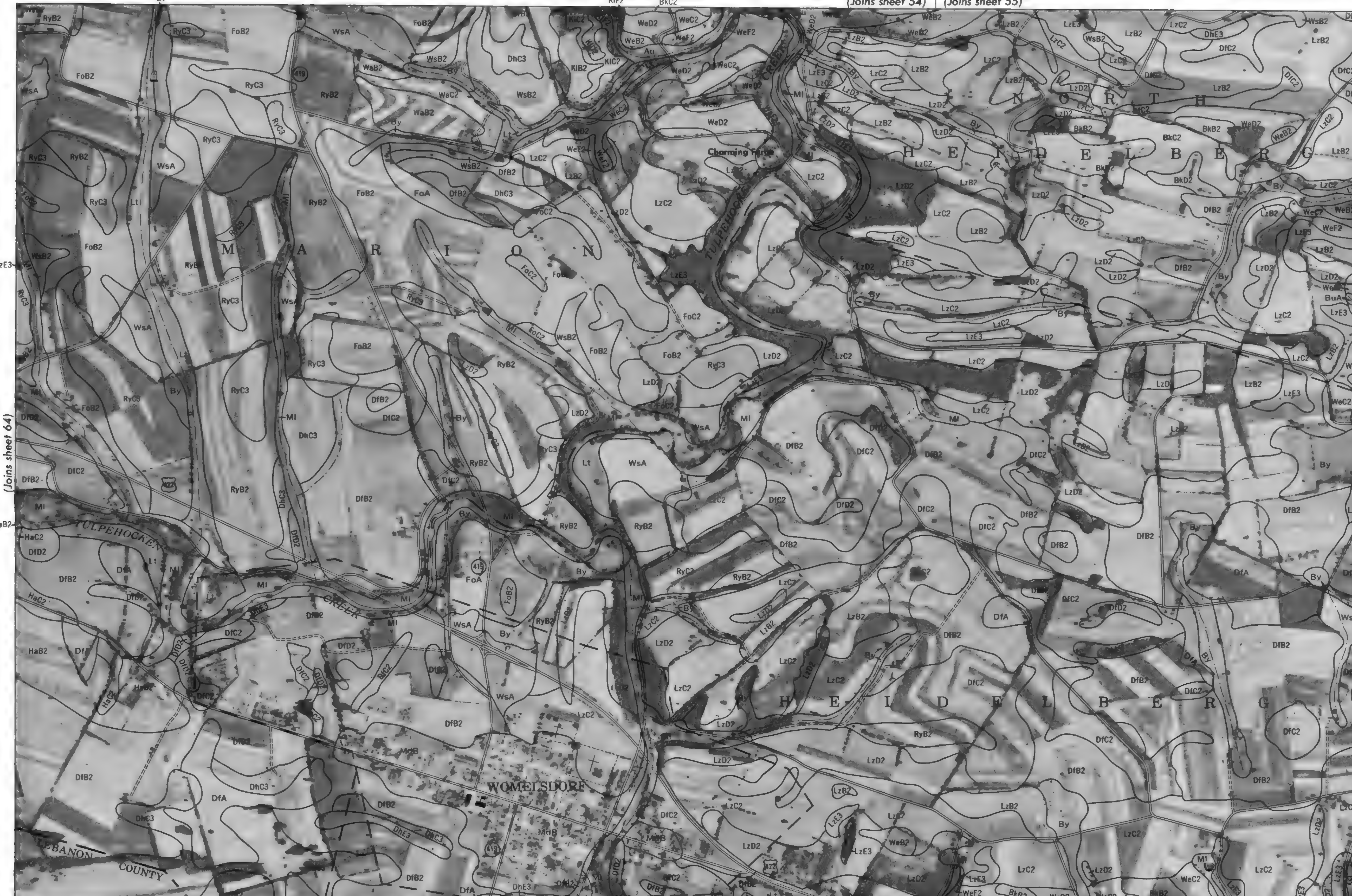
(Joins sheet 72) | (Joins sheet 73)

0 1 Mile Scale 1:15 840 0 5000 Feet

0 | 1 Mile | Scale 1:15 840 | 0 | 5000 Feet


(Joins sheet 53)
(Joins sheet 54)
(Joins sheet 65)
N
M A R I O N
LEBANON COUNTY
Tulpehocken
Creek
Mill Creek
Stouchsburg
REEDS CEMETERY
422
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

(Joins sheet 54) | (Joins sheet 55)



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 74)

(Joins sheet 55) | (Joins sheet 56)

(Joins sheet 65)

(Joins sheet 67)

(Joins sheet 75)

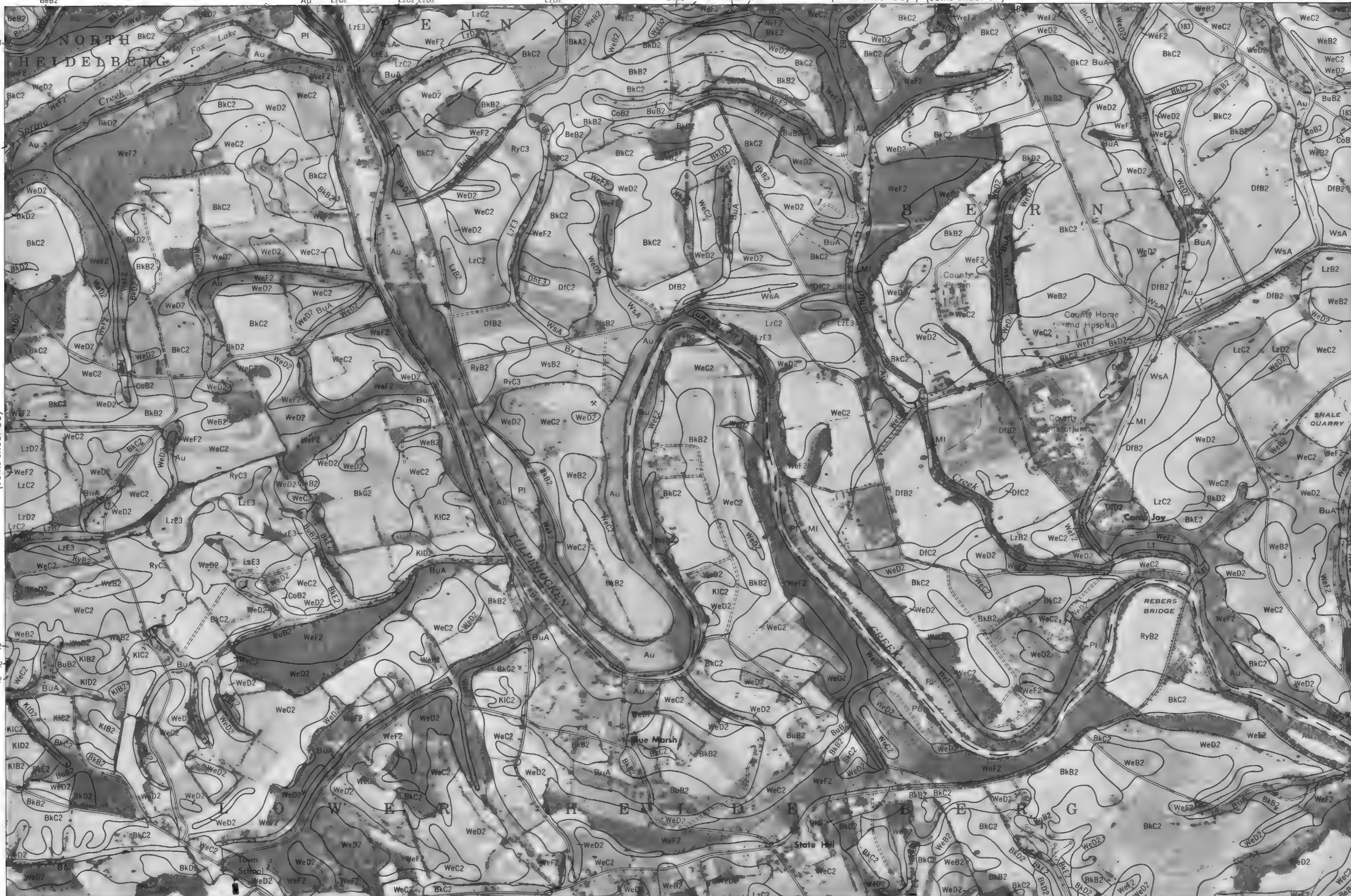
0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins sheet 56) | (Joins sheet 57)

67



0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins sheet 57) | (Joins sheet 58)

N

(Joins sheet 67)

(Joins sheet 69)

(Joins sheet 77)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

 (Joins sheet 58) | (Joins sheet 59)

69

0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

(70)

N

(Joins sheet 69)

(Joins sheet 71)

(Joins sheet 79)

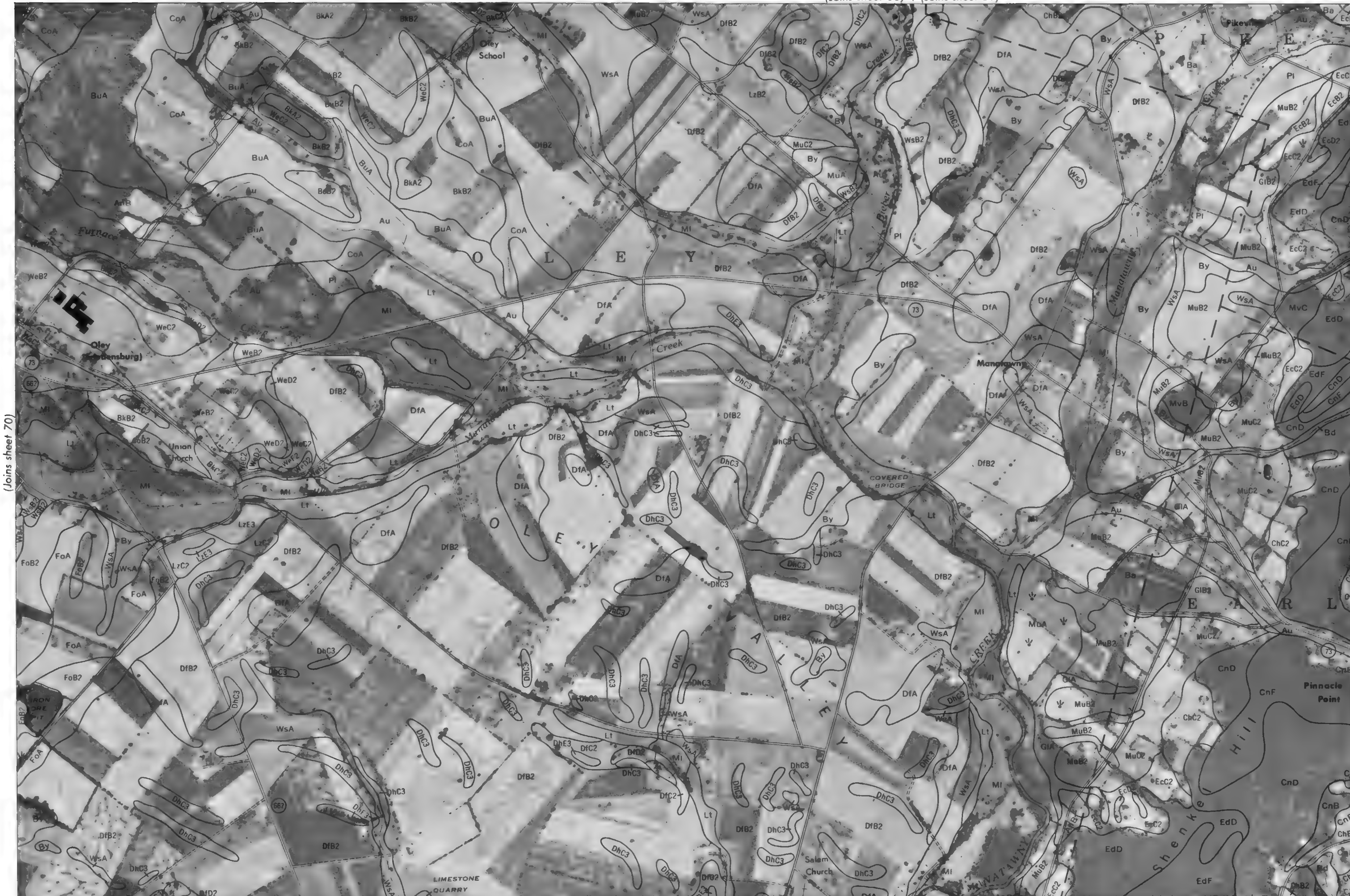
0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins sheet 60) | (Joins sheet 61)

71



(Joins sheet 70)

(Joins sheet 72)

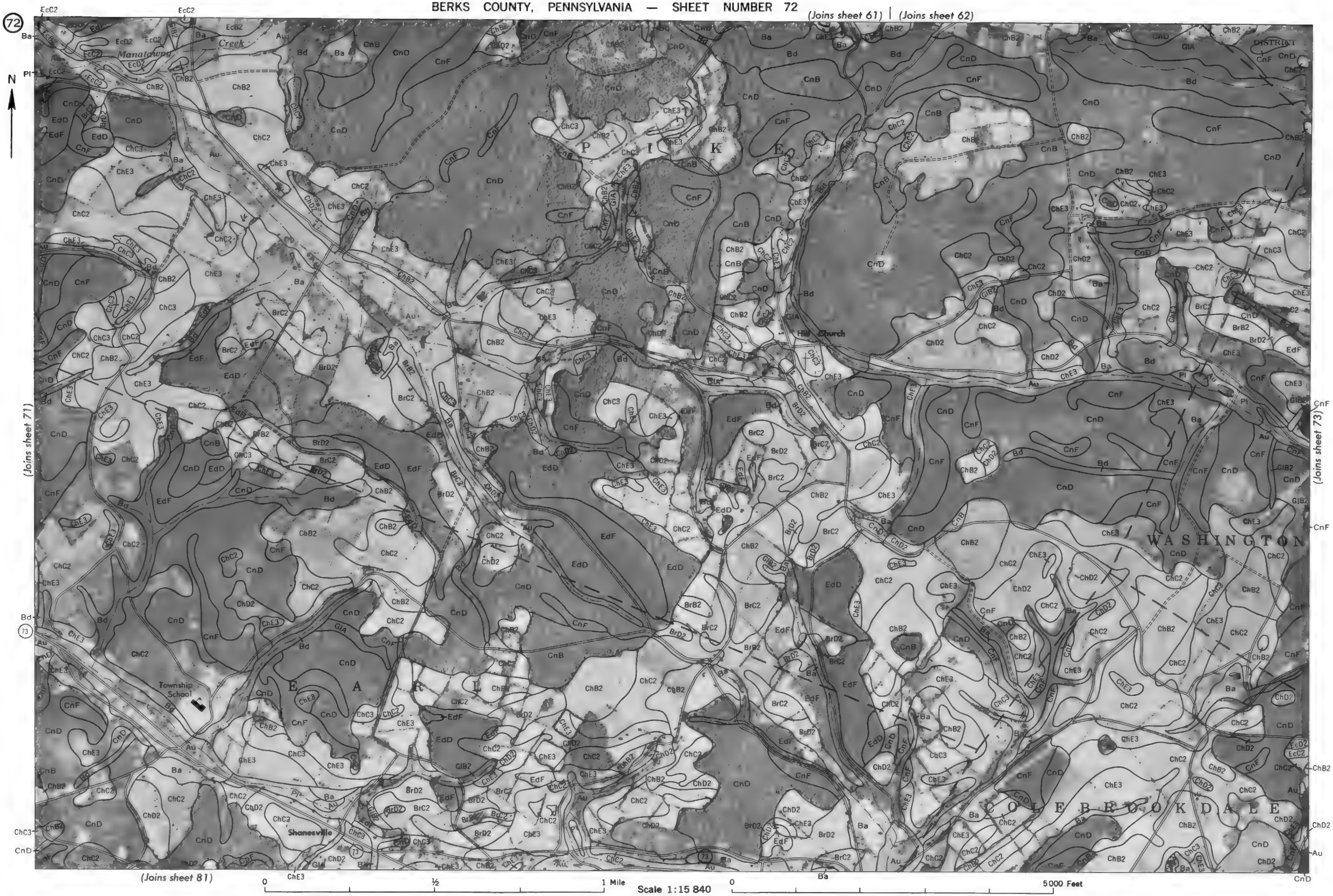
(Joins sheet 80)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 72

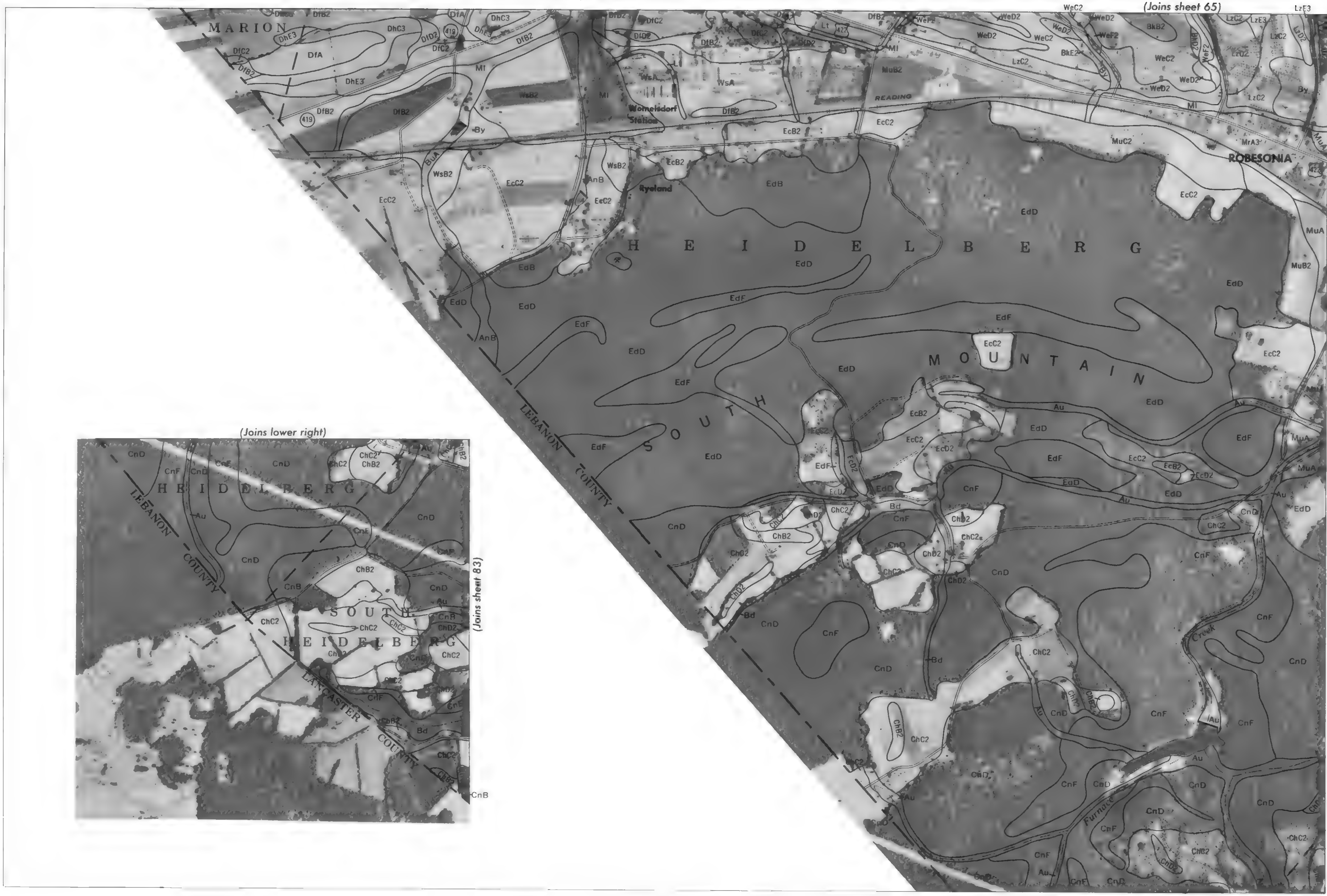


73

(Joins sheet 82)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 65)



(Joins sheet 75)

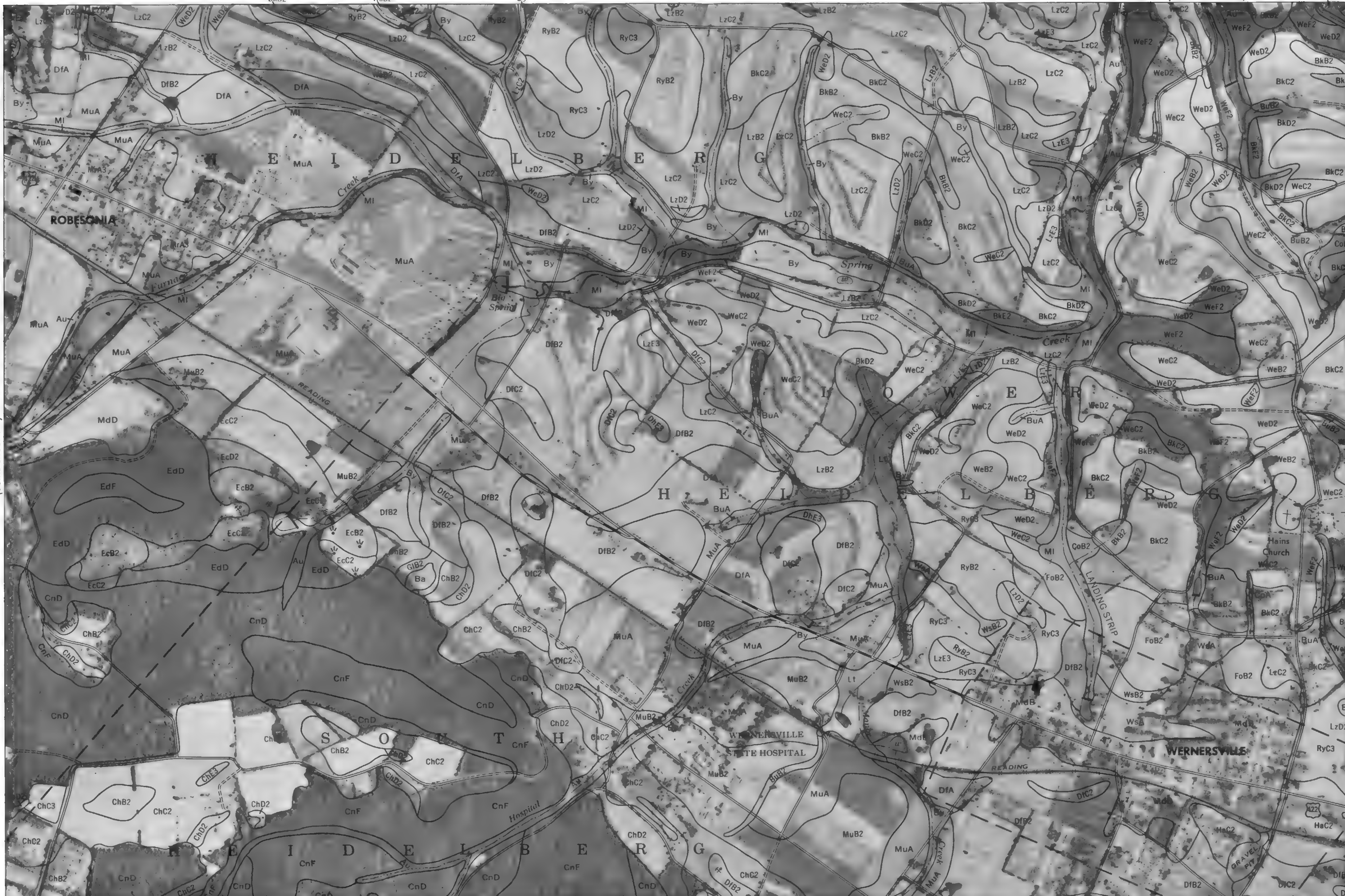
(Joins inset)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 66)

75

(Joins sheet 74)



(Joins sheet 76)

(Joins sheet 83)

0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

(Joins sheet 67)

(Joins sheet 75)

(Joins sheet 77)

(Joins sheet 84)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 68)

77

(Joins sheet 76)

(Joins sheet 78)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 85)

(Joins sheet 69)

(Joins sheet 77)

(Joins sheet 79)

(Joins sheet 86)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet


(Joins sheet 70)
79
N
(Joins sheet 78)
(Joins sheet 80)
(Joins sheet 87)
LOWER ALSACE
ALSACE
Five Points
Alsace
EXETER
OLEY
Schwarzwald Hill
Breneiser Woods
GRAVEL PIT
LIMESTONE QUARRY
Limekiln
Manatawny Creek
Limekiln Creek
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

80

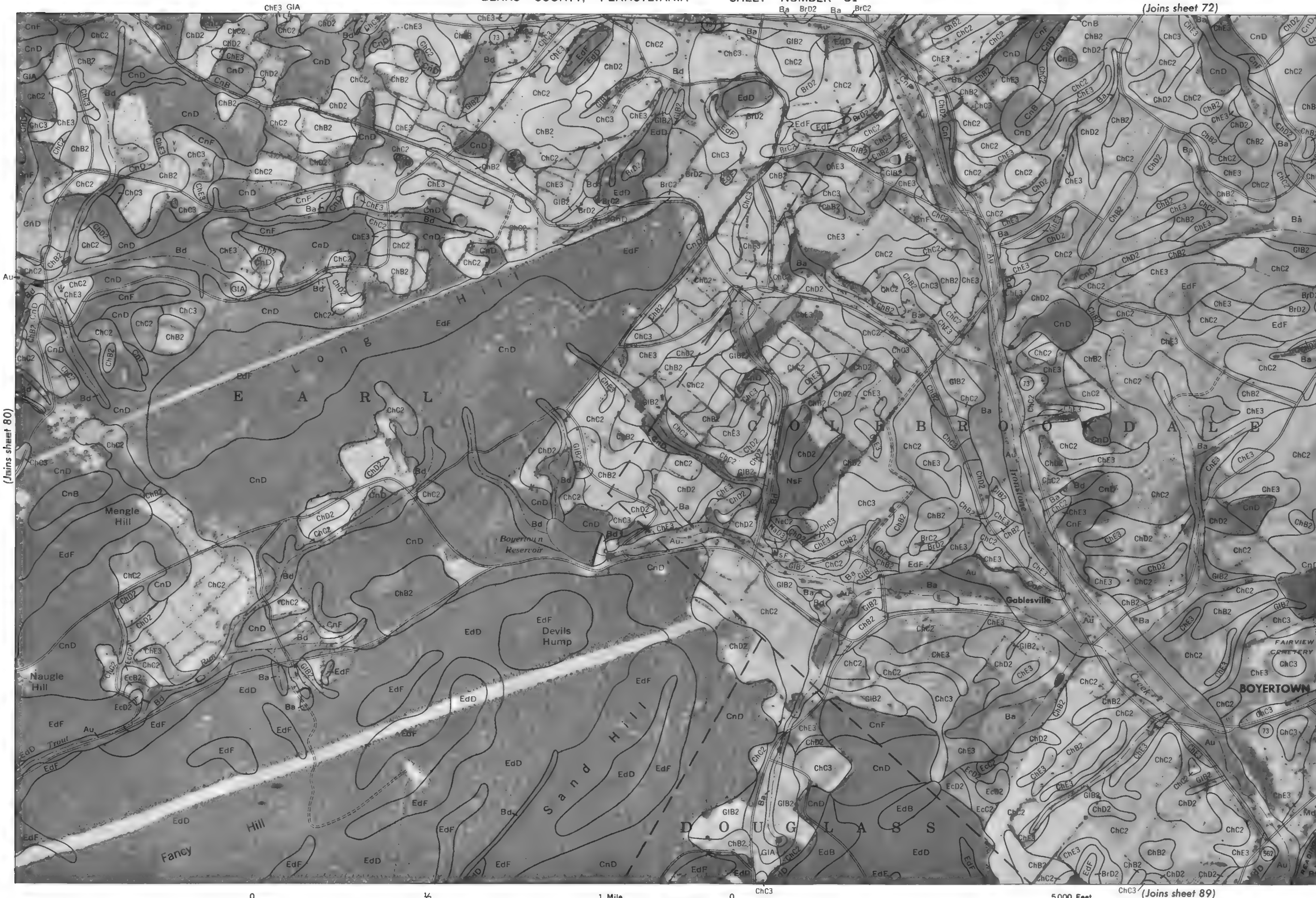
(Joins sheet 71)

(Joins sheet 79)

(Joins sheet 81)

(Joins sheet 88)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

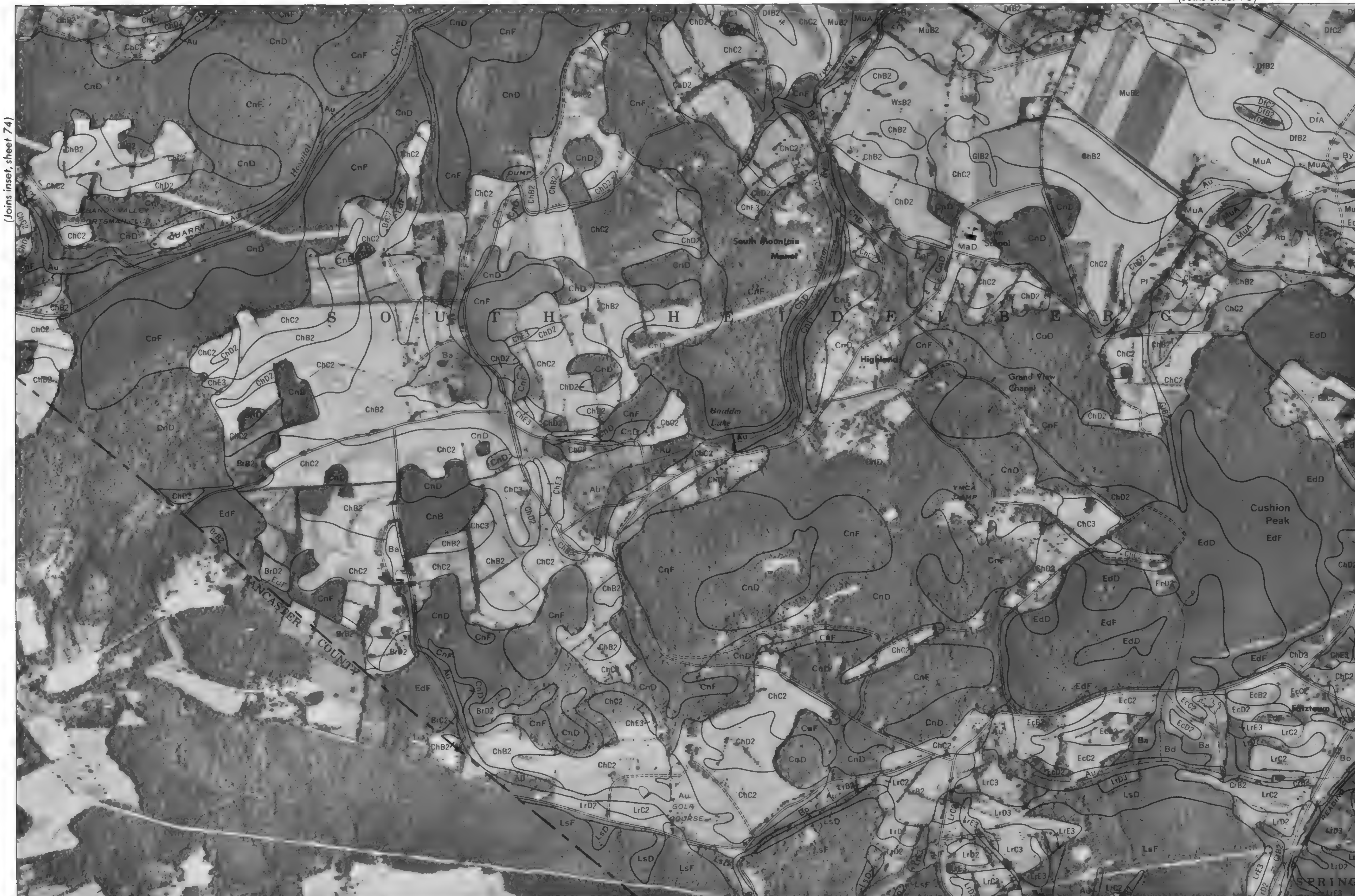

(Joins sheet 72)
(Joins sheet 80)
(Joins sheet 82)
(Joins sheet 89)
N
E A R L
C O L E B R O O K D A L E
D O U G L A S
Long Hill
Mengle Hill
Naugle Hill
Devils Hump
Sand Hill
Fancy Hill
Boyertown Reservoir
Gablesville
BOYERTOWN
FAIRVIEW CEMETERY
Ironstone Creek
Trout Run
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 82

(Joins sheet 75)

83

(Joins inset, sheet 74)



(Joins sheet 84)

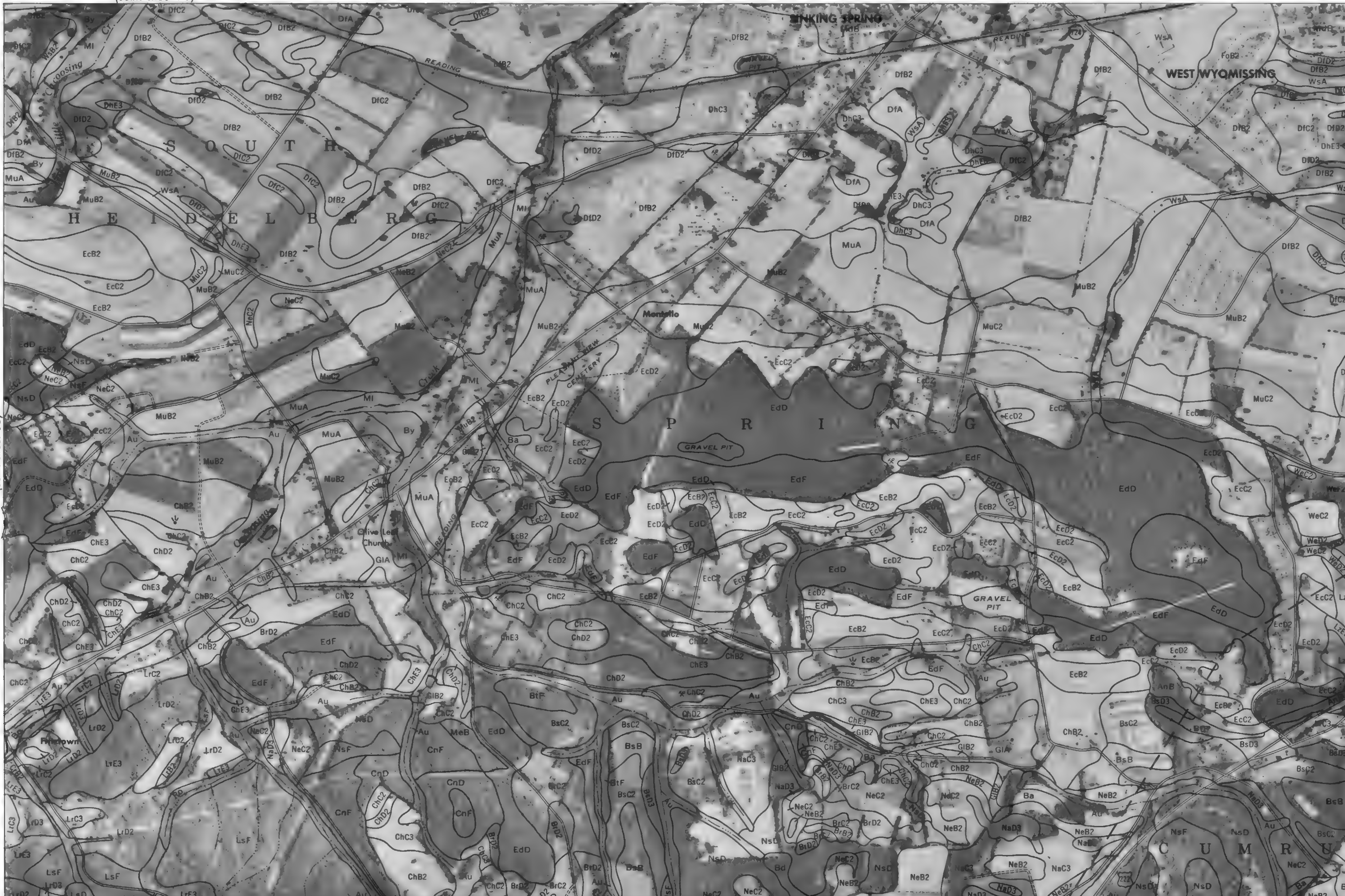
(Joins sheet 90)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 76)

N

(Joins sheet 83)



(Joins sheet 85)

(Joins sheet 91)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 77)

85

N

(Joins sheet 84)

(Joins sheet 86)

(Joins sheet 92)

0 ½ 1 Mile

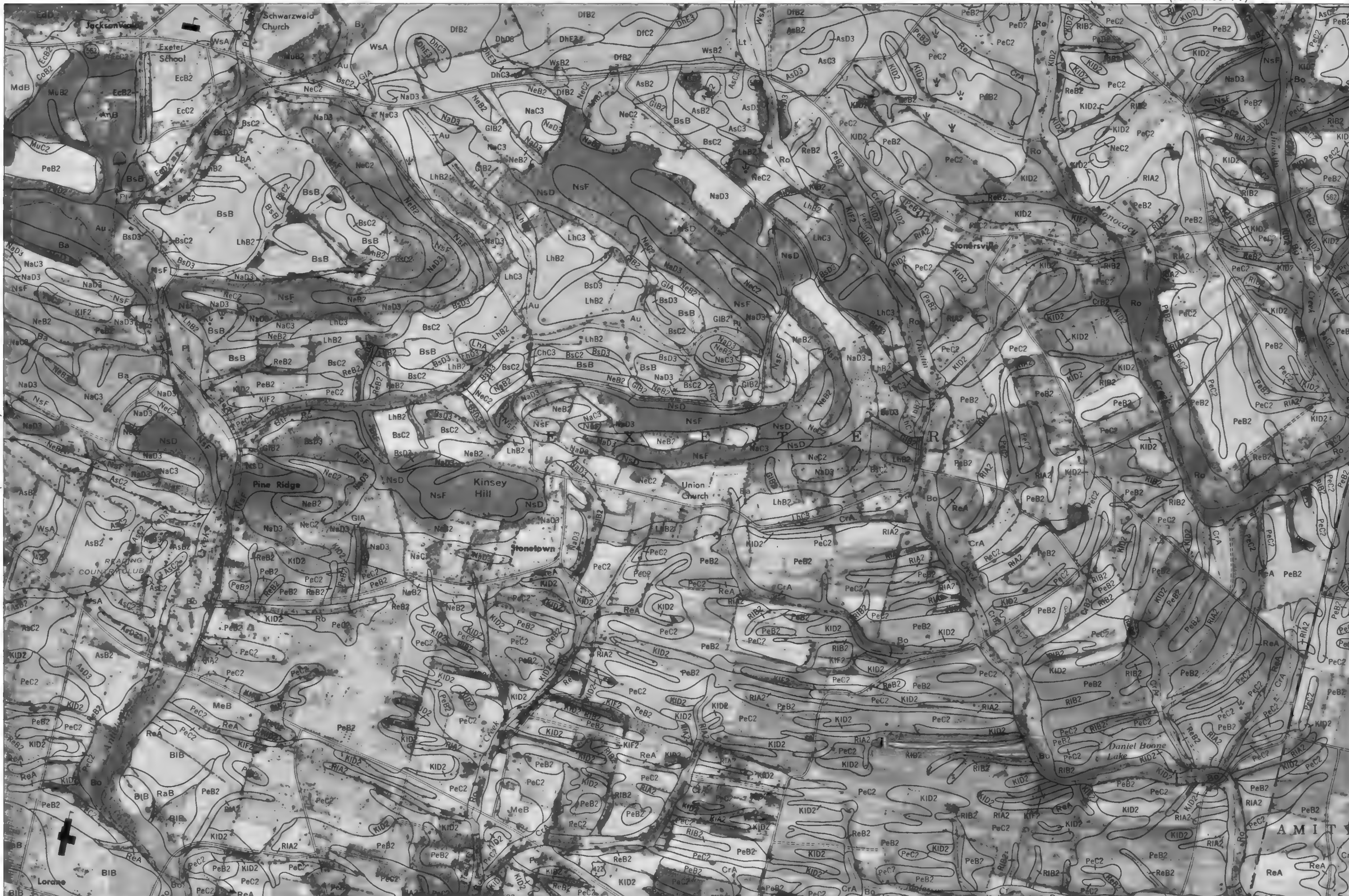
Scale 1:15 840

0 5000 Feet


(Joins sheet 78)
(Joins sheet 85)
(Joins sheet 87)
(Joins sheet 93)
N
READING
(county seat)
Neversink Mountain
LOWER ALSACE
Klapperthall Junction
SCHUYLKILL
RIVER
Poplar Neck
FOREST HILLS CEMETERY
Neversink
EXETER
REIFFTOWN
ST LAWRENCE
Creek
Hains Hill
Island
SEWAGE DISPOSAL
Ridgewood
Seyfert
CUMRU
ROBESON
READING
PENNSYLVANIA
DESILTING BASIN
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

(87)

(Joins sheet 79)



(Joins sheet 86)

(Joins sheet 88)

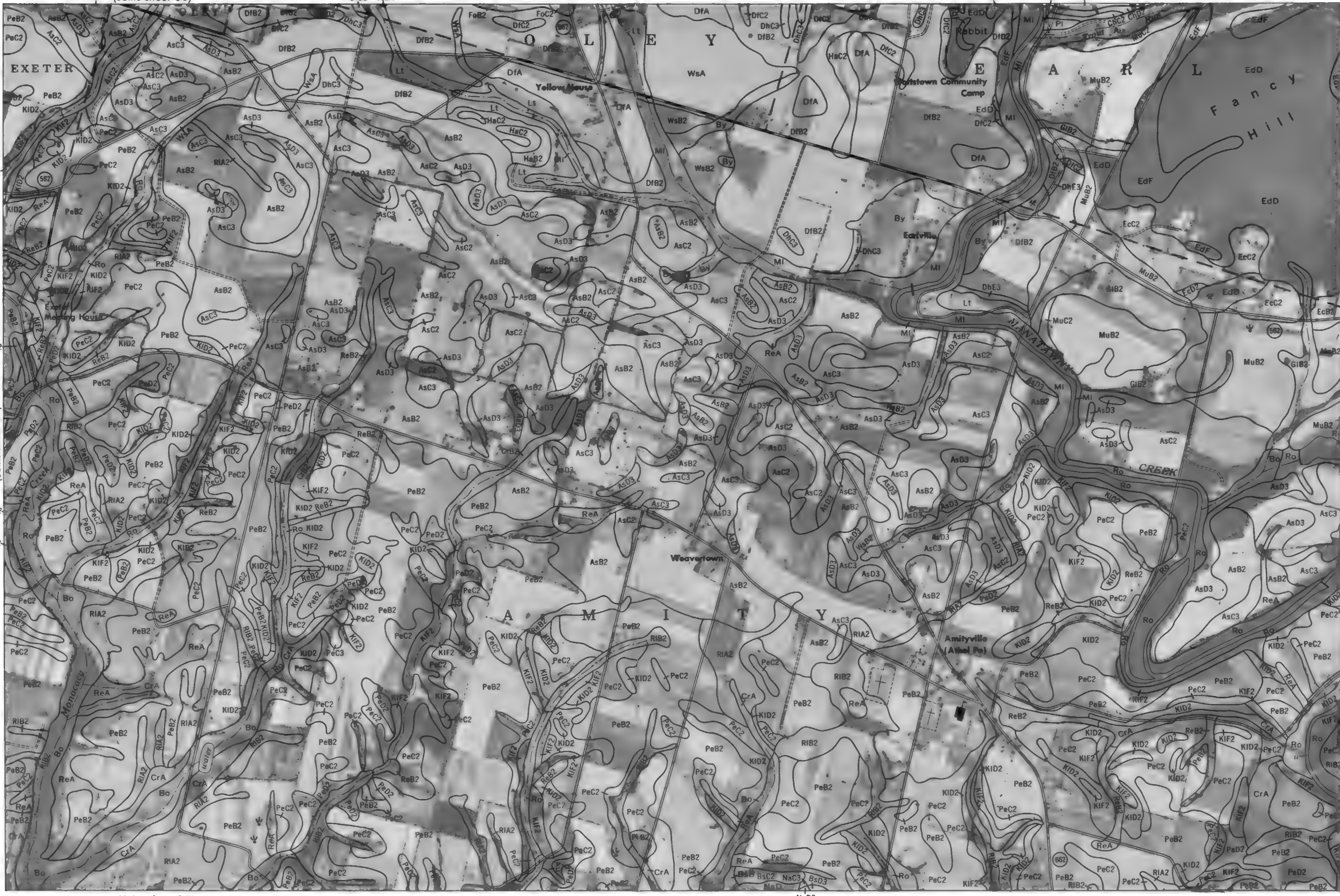
(Joins sheet 94)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins sheet 80)



(Joins sheet 87)

(Joins sheet 89)

(Joins sheet 95)

0 ½ 1 Mile

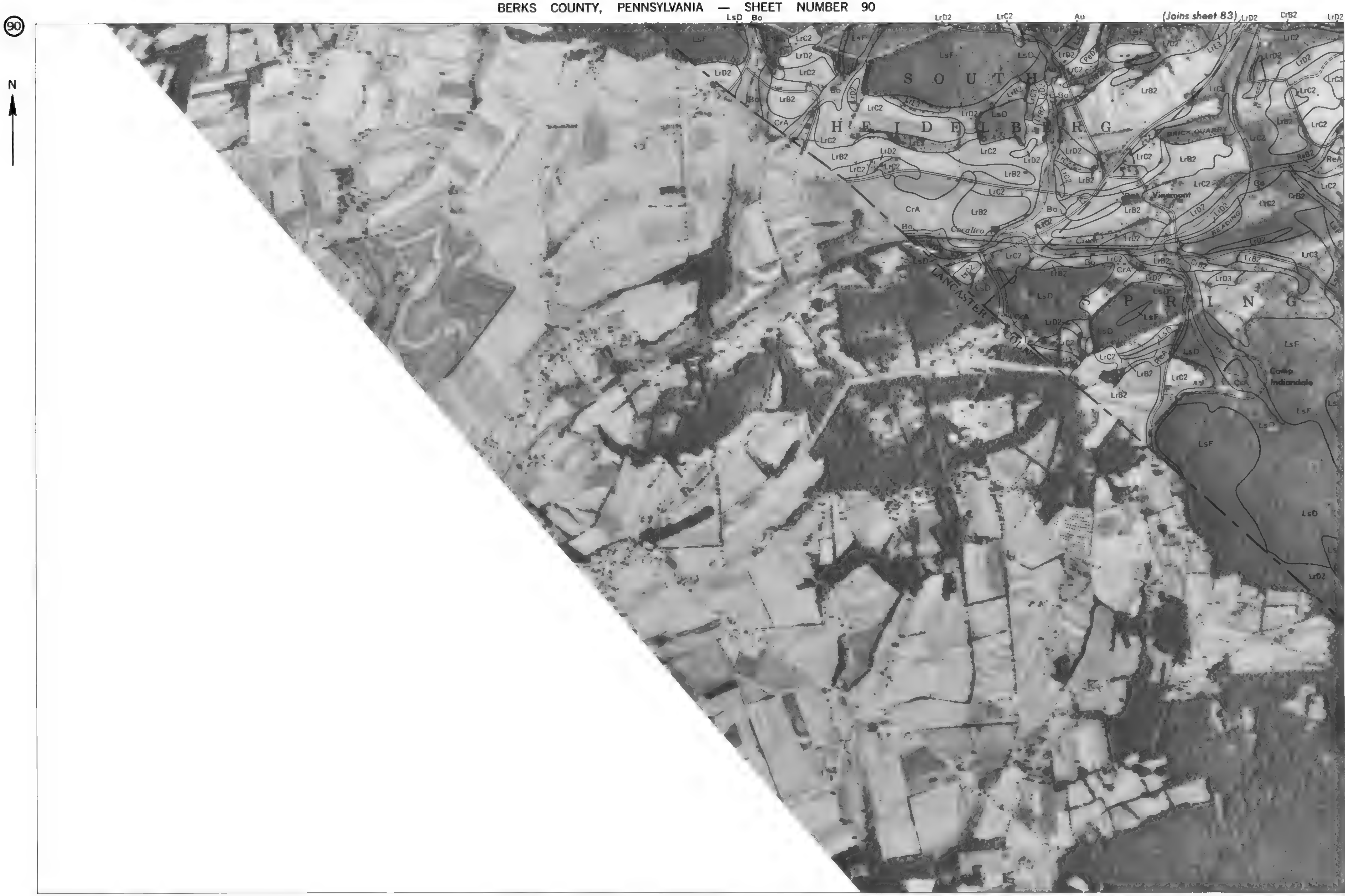
Scale 1:15 840

0 5000 Feet

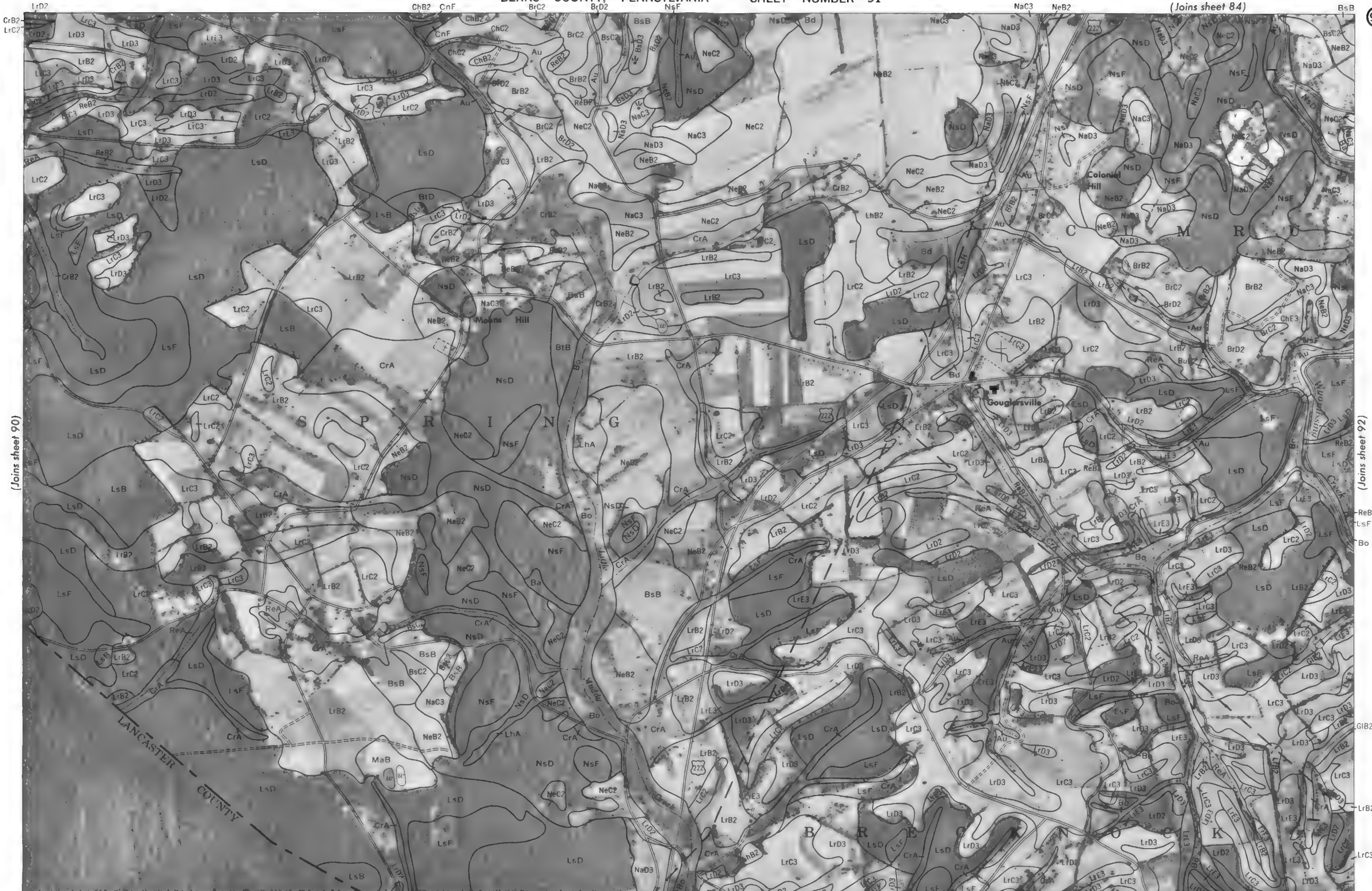
Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet



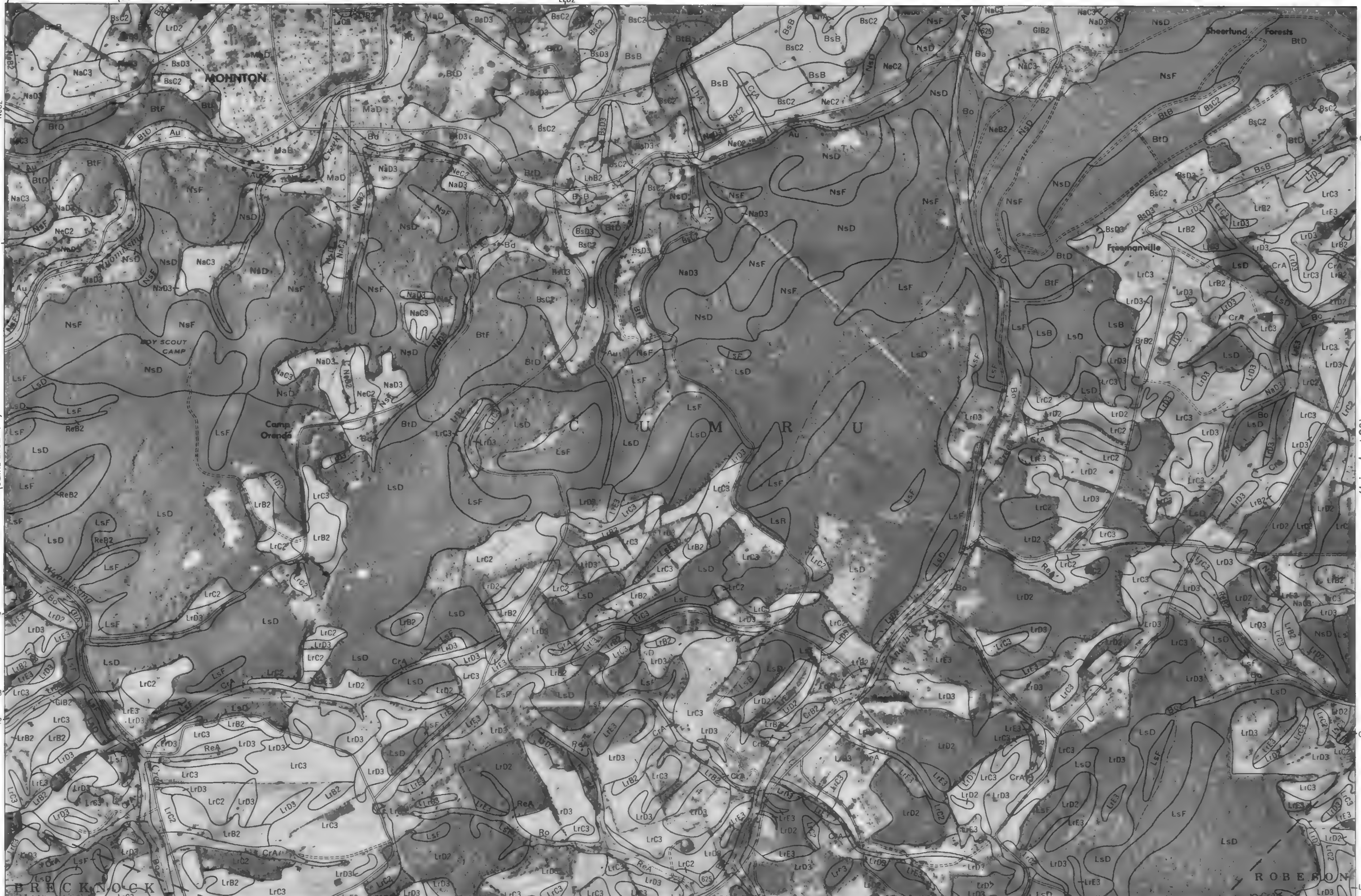
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet



0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 92

(Joins sheet 85)

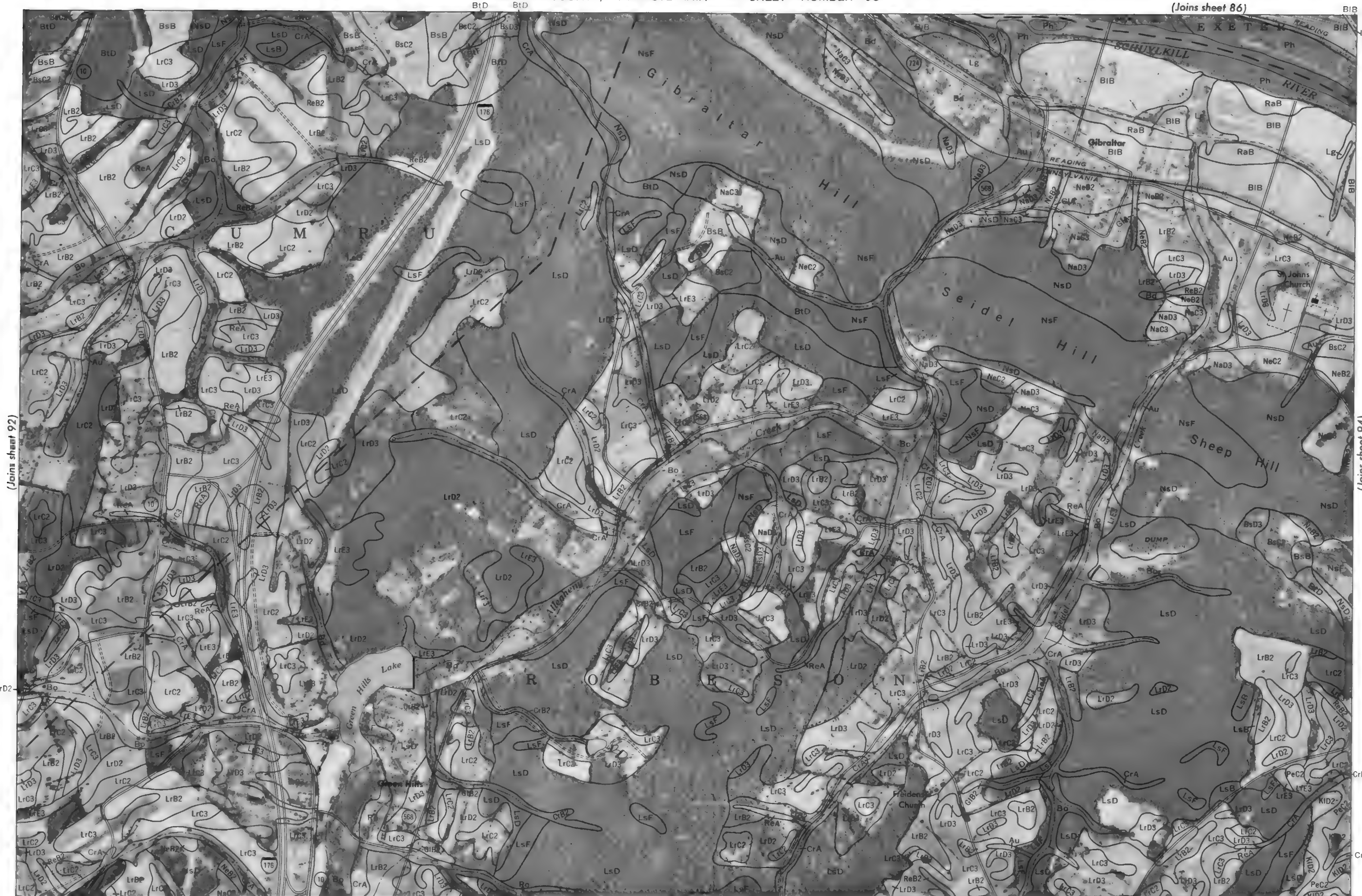


(Joins sheet 98)

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


94
(Joins sheet 87)
(Joins sheet 93)
(Joins sheet 95)
(Joins sheet 100)
N
Lorane
Antietam Creek
READING
SCHUYLKILL
RIVER
Molasses
Fairview Church
Heister Creek
Baumstown
A M I T Y
Rebeson Crossing
Hohls Crossing
Beards School
Furnace Hill
READING PENNSYLVANIA
QUARRY
Cedar Hill
R O B E S O N
Hay Creek
BIRDSBORO
DESILTING BASIN
ST MICHAELS CEMETERY
Mount Airy
IMMACULATE CONCEPTION CEMETERY
U N I O N
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

BERKS COUNTY, PENNSYLVANIA — SHEET NUMBER 95

(Joins sheet 88)

95

(Joins sheet 94)

(Joins sheet 96)

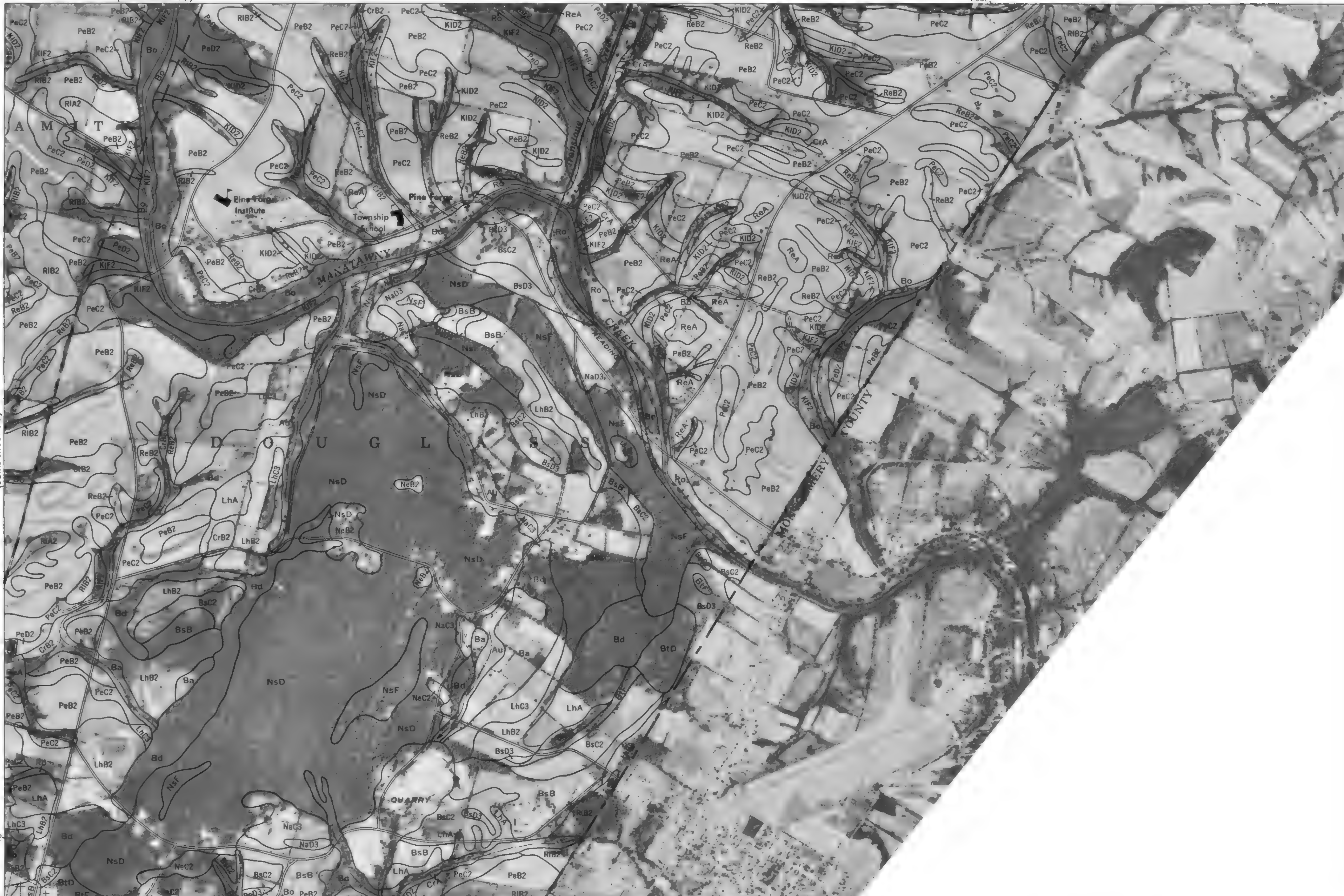
(Joins sheet 101)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

96

(Joins sheet 89)

(Joins sheet 95)

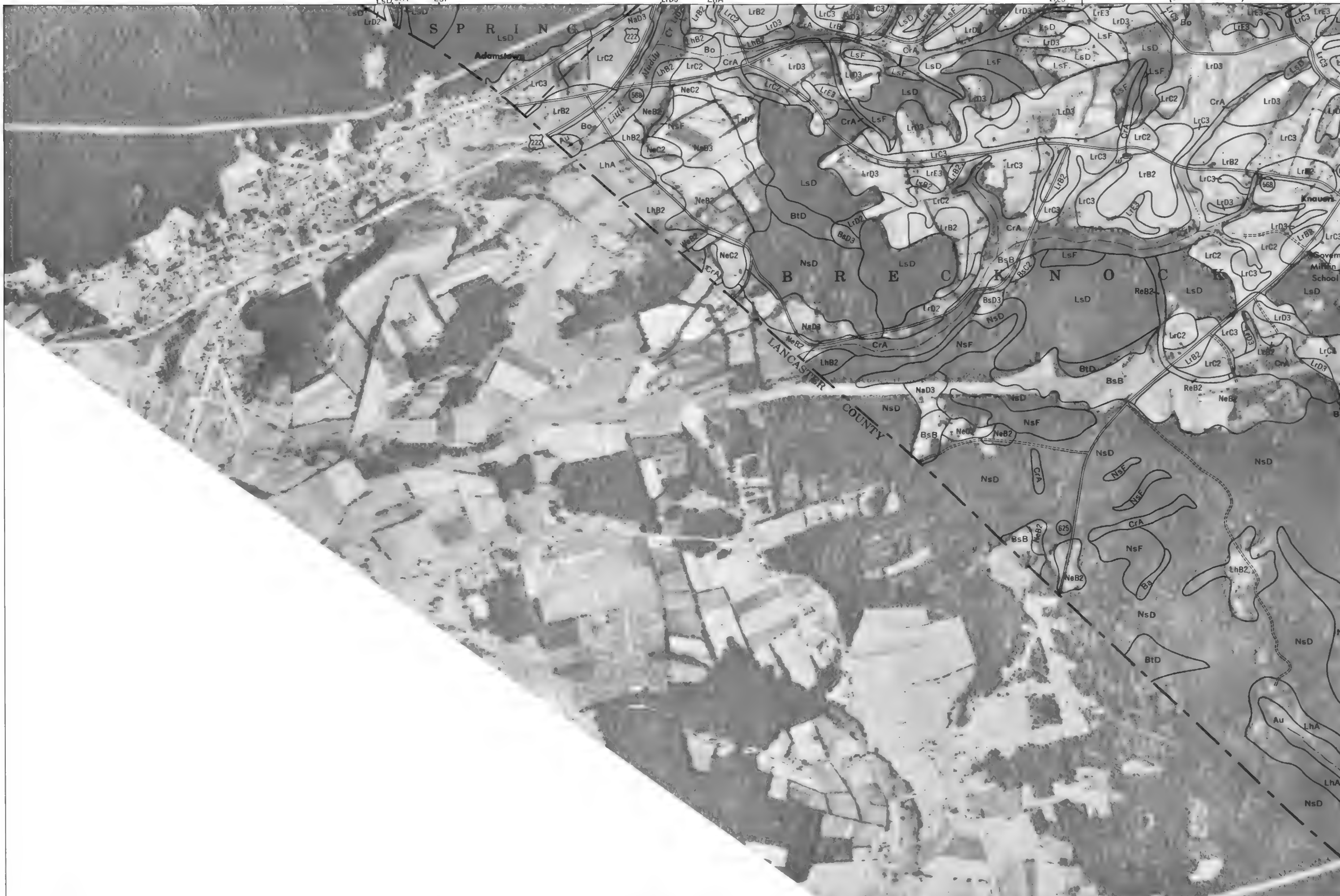


(Joins inset, sheet 105)

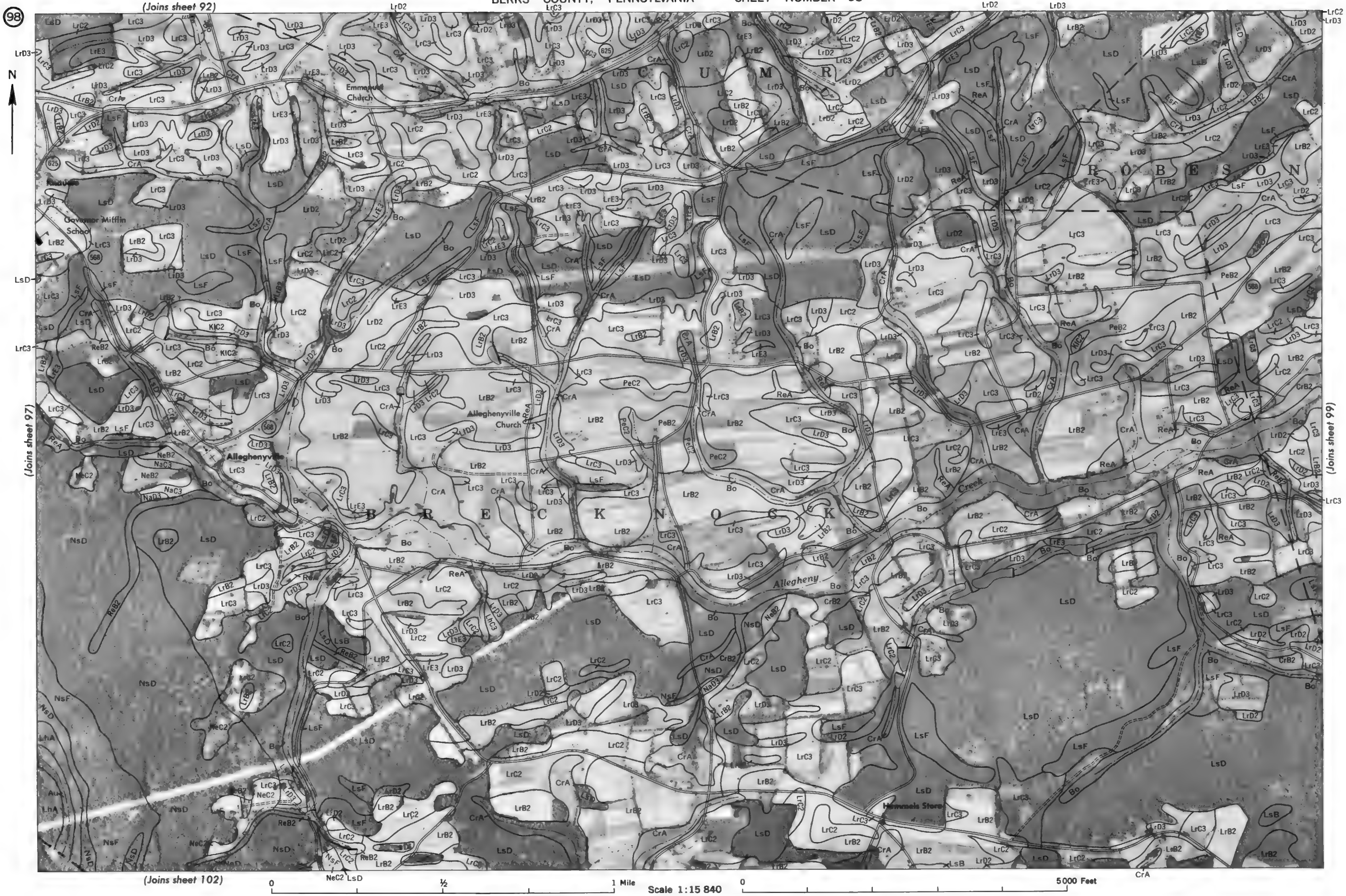
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 91)

97

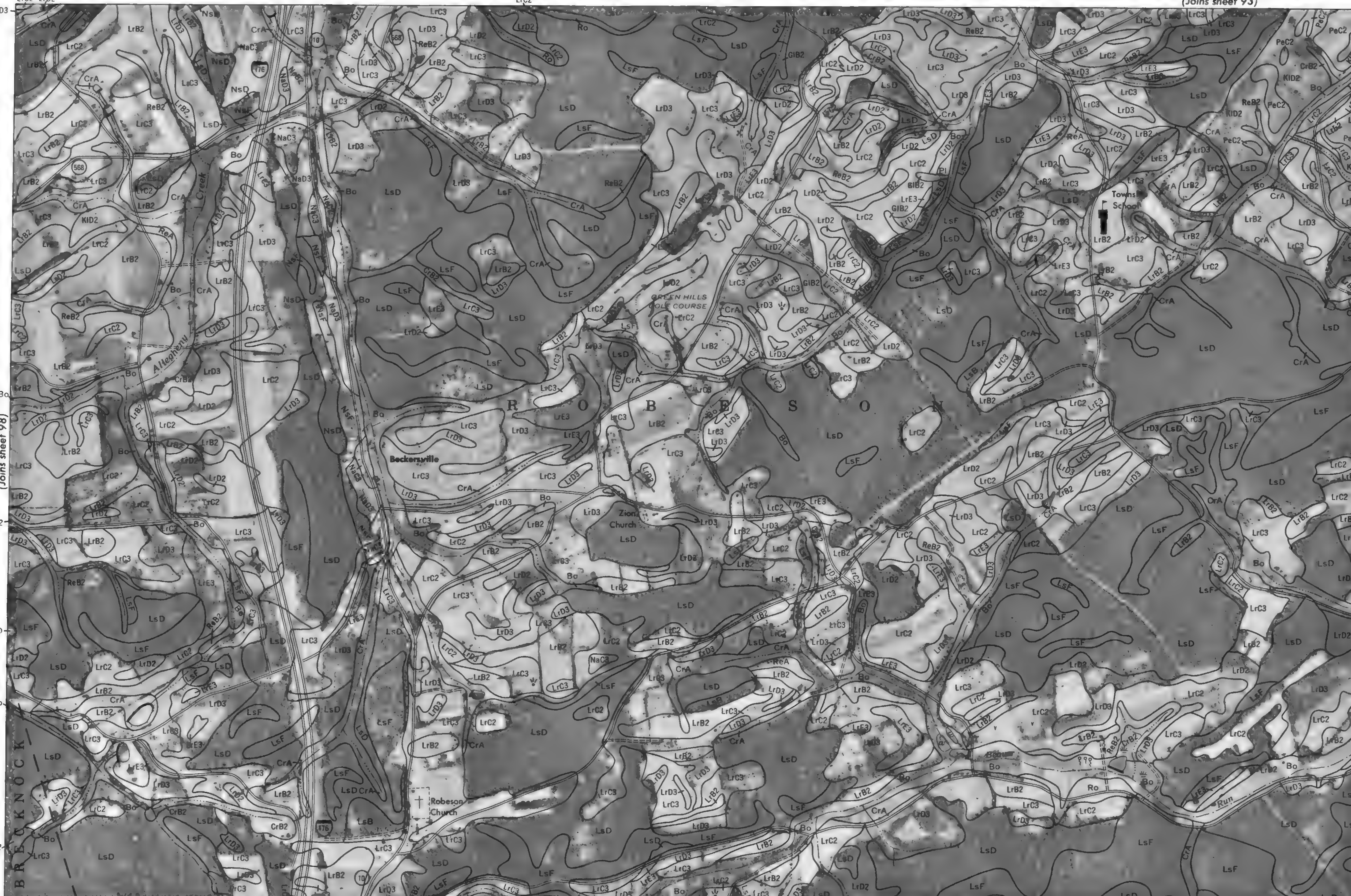


0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


98
(Joins sheet 92)
(Joins sheet 97)
(Joins sheet 99)
(Joins sheet 102)
N
C U M R U
R O B E S O N
B R E C K N O C K
Emmanuel Church
Governor Mifflin School
Alleghenyville
Alleghenyville Church
Allegheny Creek
Hummels Store
625
568
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

(Joins sheet 93)

99

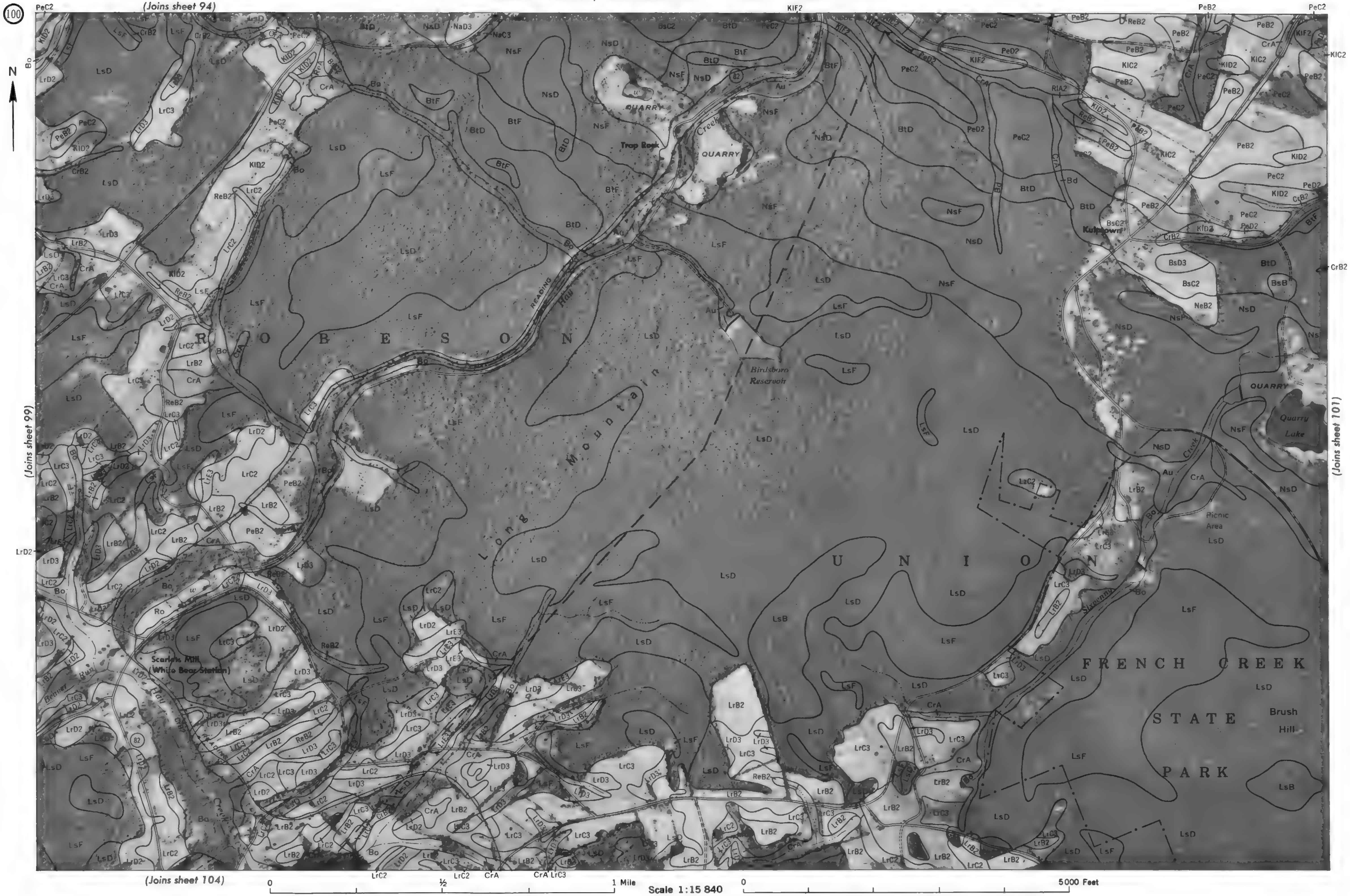


0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

(Joins sheet 103)



Scale 1:15 840

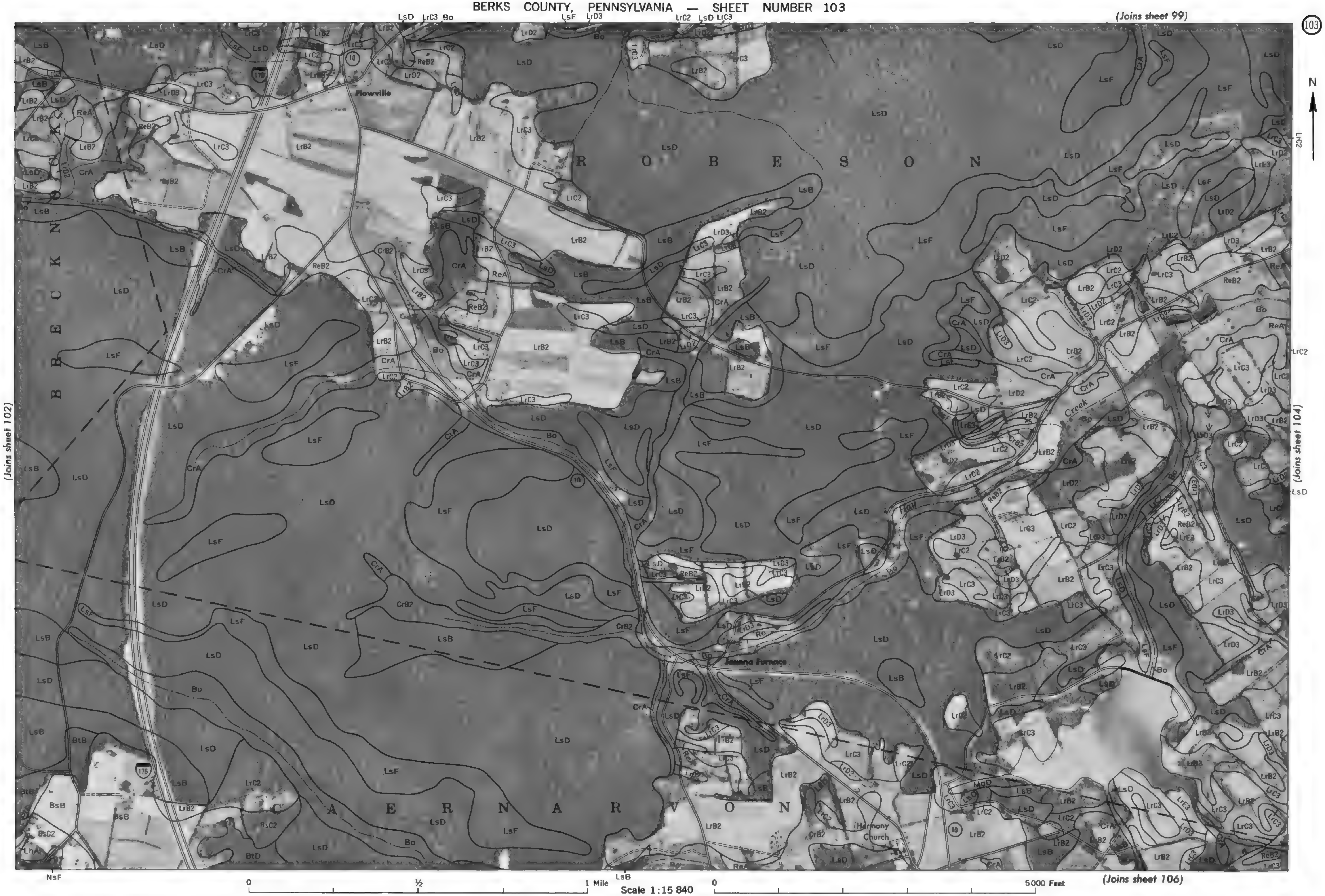
(Joins sheet 95)

101

(Joins sheet 105)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

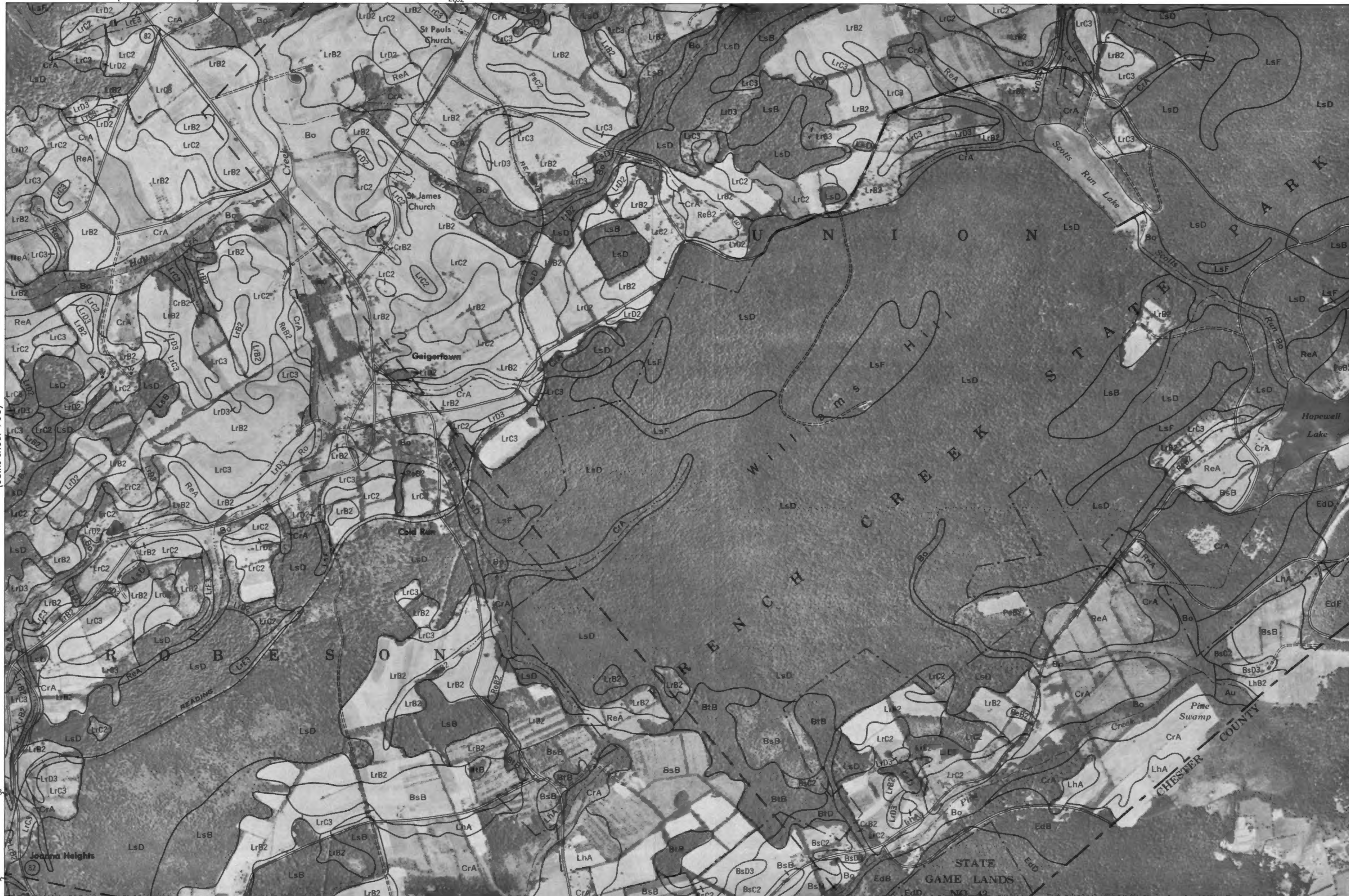

102
N
(Joins sheet 98)
(Joins sheet 103)
(Joins inset)
(Joins lower right)
(Joins sheet 106)
B R E C K N O C K
C A E R N A R V O N
LANCASTER COUNTY
STATE GAME LANDS NO 52
STATE GAME LANDS NO 52
STATE GAME LANDS NO 52
Maple Grove Park
Muddy Creek
PA TURNPIKE
LsD
LsB
LsF
LrB2
LrC2
LrD2
CrA
PeB2
Bo
BtB
NsD
LhA
LhB2
BsB
BsC2
Au
NeC2
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet


103
(Joins sheet 99)
(Joins sheet 102)
(Joins sheet 104)
(Joins sheet 106)
N
R O B E S O N
B R E C K N O C K
C A E R N A R V O N
Plowville
Joanna Furnace
Harmony Church
Hay Creek
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

(Joins sheet 100)

N

(Joins sheet 103)



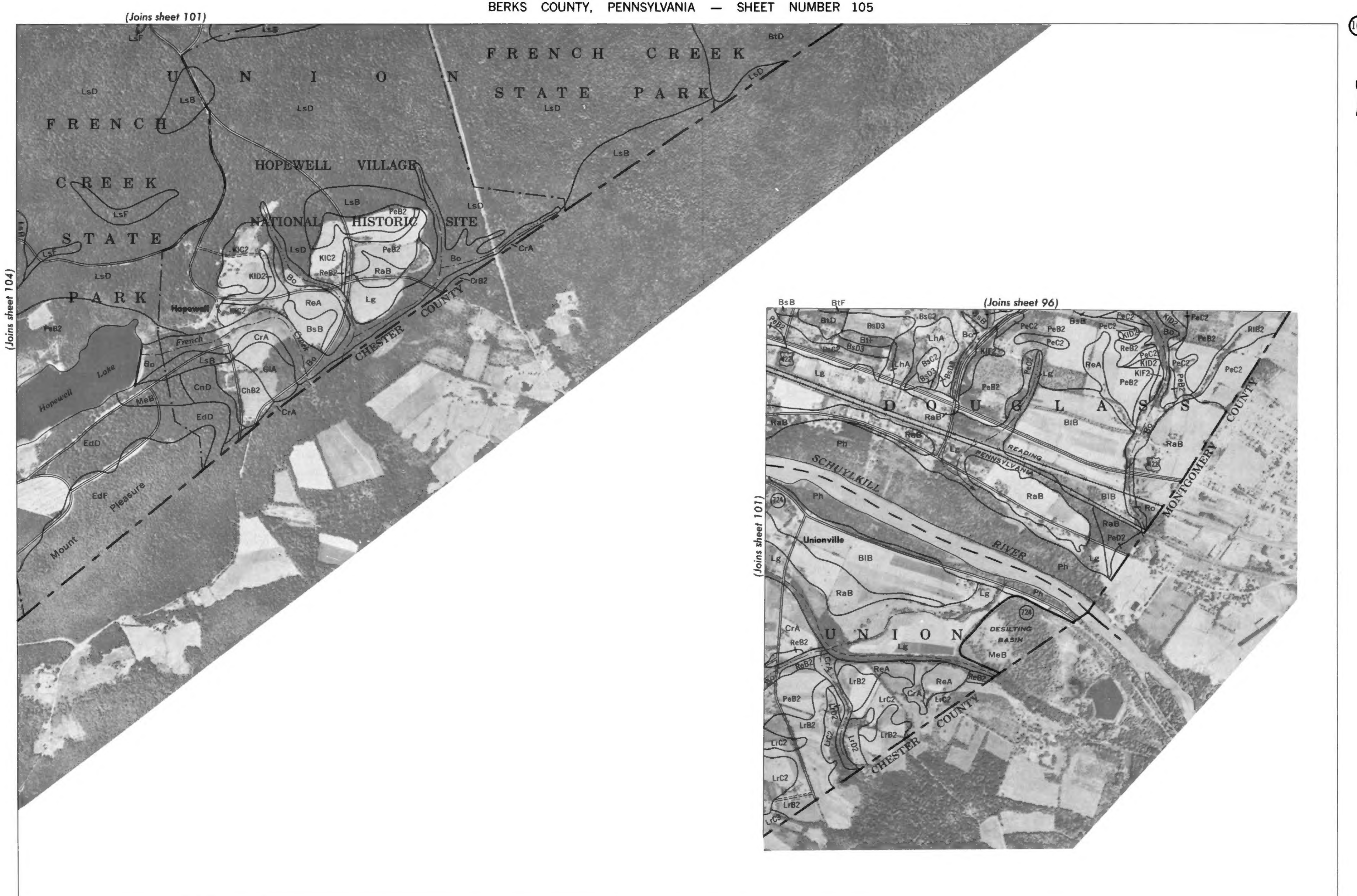
(Joins sheet 105)

(Joins sheet 107)

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet



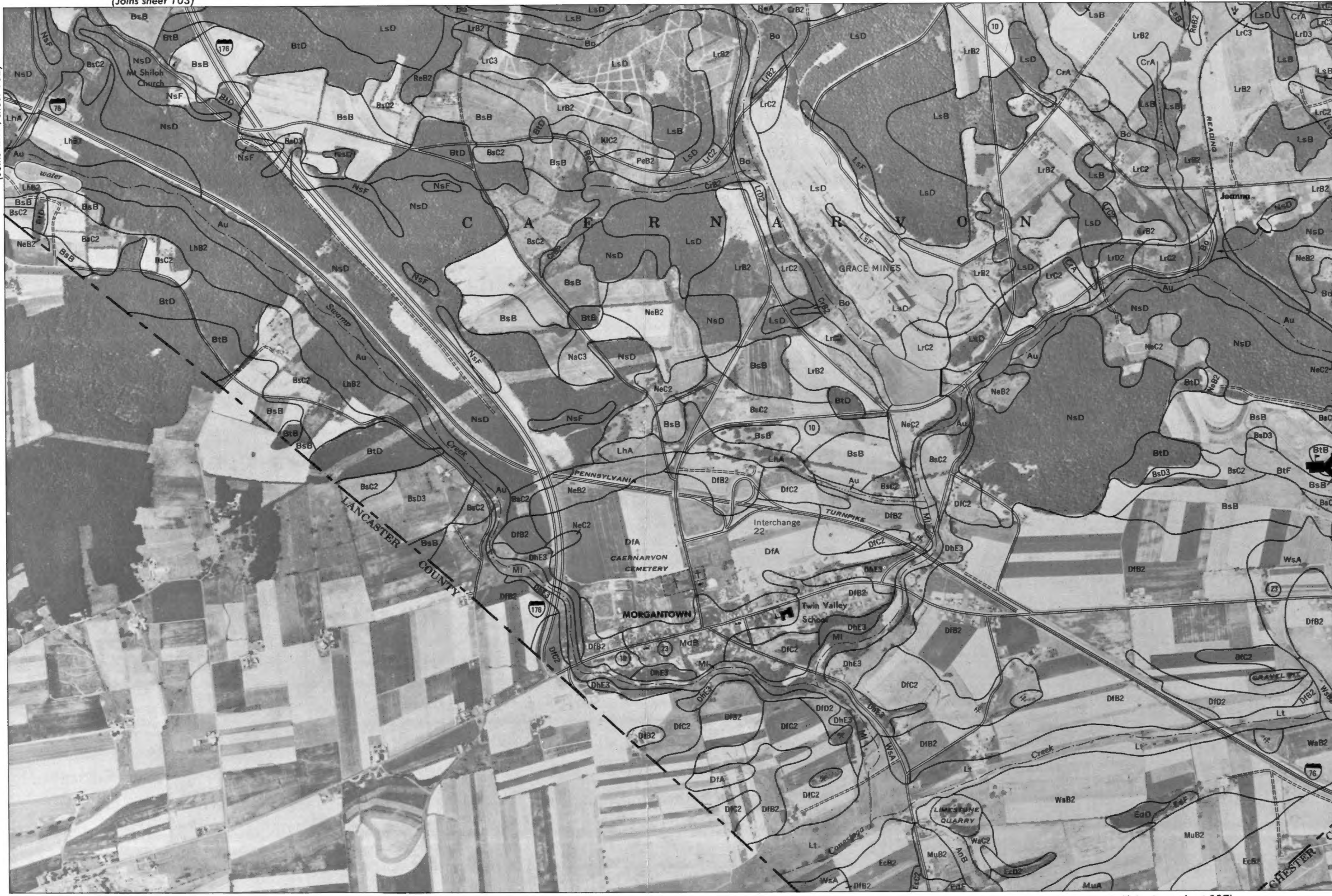
0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

106

(Joins sheet 103)

N

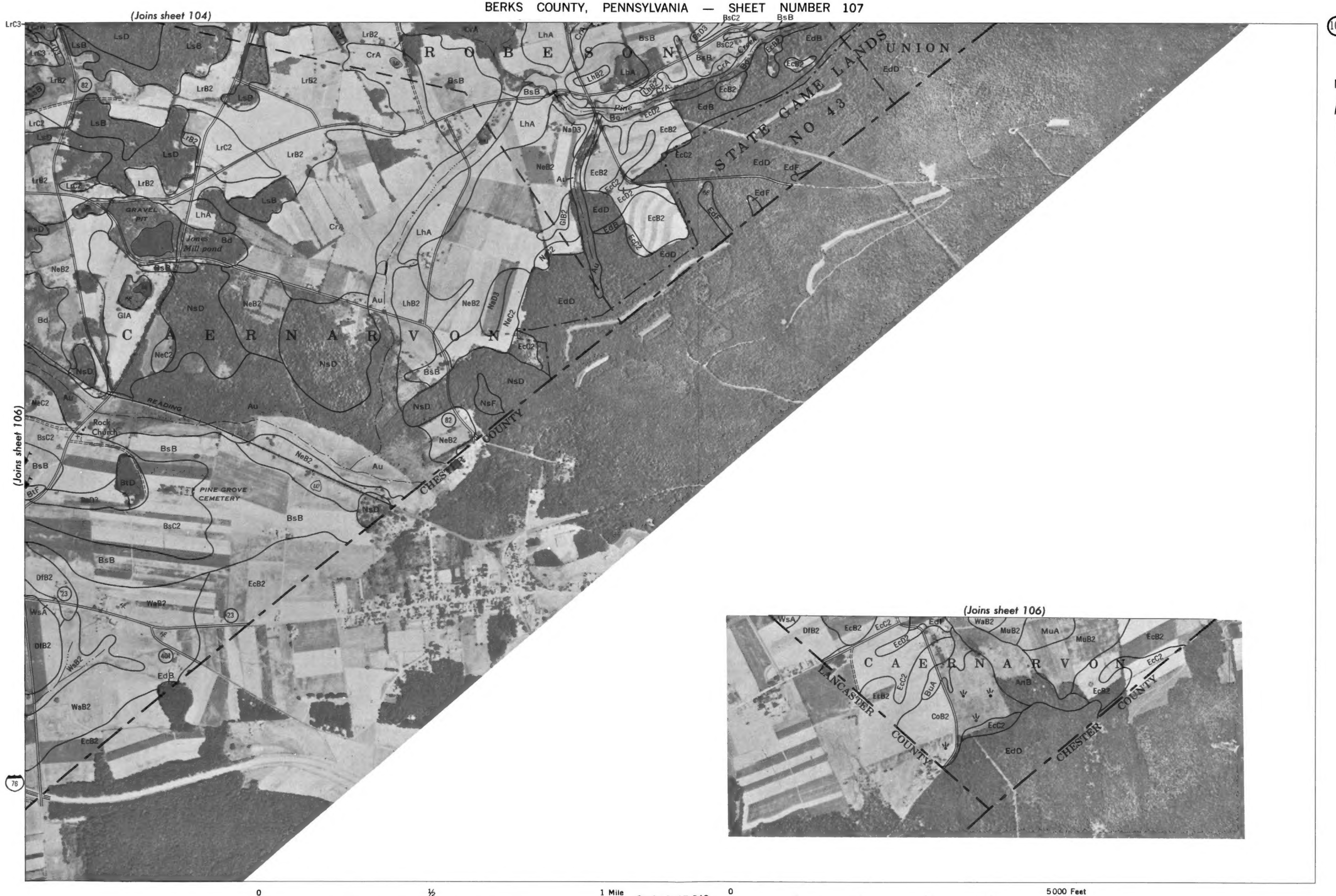
(Joins inset, sheet 102)



(Joins sheet 107)

(Joins inset, sheet 107)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet



(Joins sheet 104)
(Joins sheet 106)
(Joins sheet 106)
107
N
ROBESON
UNION
STATE GAME LANDS NO 43
CAERNARVON
CHESTER COUNTY
LANCASTER COUNTY
GRAVEL PIT
Jones Mill pond
Rock Church
PINE GROVE CEMETERY
READING
Pine Creek
0
½
1 Mile
Scale 1:15 840
0
5000 Feet